THE HOPE REPORTS

VOL. VIII

APPENDIX

1890–1910

INCLUDING FIVE SUBFAMILIES OF THE BLATTIDAE

By R. SHELFORD

EDITED BY

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ORTHOPTERA

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WITH 1 COLOURED PLATE

The Blattidæ form a family of the order Orthoptera characterised by the deflexed head, the body typically flattened dorso-ventrally, the wings, when present, with the posterior part capable of folding like a fan, the three pairs of legs differing but little from one another and modified for running, the coxæ large and flattened.

Characters. — The *head* is so carried that the vertex is directed forward, the mouth backward and the front downward. It is joined to the thorax by a slender neck, in the thin integument of which occur some chitinised sclerites. The frons is separated from the clypeus by a fine angulate suture. The mouth-parts are of a typically mandibulate type, but little use of them has been made in classification; the labrum is well marked off from the clypeus by a transverse joint, it is orbicular or triangular in shape; the mandibles are toothed; the maxillæ, consisting of *cardo, stipes, lacinia* and *galea*, bear one pair of five-jointed palpi; the submentum is very large and forms the greater part of the under surface of the head, the labium is deeply cleft and carries a pair of three-jointed palpi, the lingua is a large lobe lying over the cleft of the labium.

The *antennæ* are long, slender and multi-articulate, usually ciliated; in some genera (e. g. *Pseudomops, Thyrsocera, Hypnorna*) the basal half of the antenna is incrassated and plumose(1).

The *eyes* are usually large and reniform; they are placed on the sides of the head; in many genera they are approximated on the vertex; in the cave-haunting *Nocticola* they are reduced or absent. Close to the insertions of the antennæ occur a pair of small circular areas, yellow in colour, known as the fenestræ or ocelliform spots; in the males of *Corydia* and *Polyphaga* these are replaced by true ocelli.

(1) In the genus *Pseudomops* this character is confined to the female sex

The *pronotum* is large and frequently covers the head entirely; it is most varied in shape and may be orbicular, semi-orbicular, cucullate, with reflected border, rugose or tuberculate. The prosternum is small and inconspicuous.

The *mesonotum* and *metanotum* are very simular to one another in structure; in some genera a small triangular part of the mesonotum, the *scutellum*, is exposed when the tegmina and wings are closed. The meso- and metasternum though larger than the prosternum are not readily to be seen in dried specimens.

The *tegmina* or *elytra* may be completely developed, abbreviated, scale-like or absent; in many genera the males are winged, but the females are apterous (*Polyphaga*, *Deropeltis* etc.).

The tegmina overlap to a greater or less extent; they are horny, coriaceous or membranous; in the genus *Diaphana* they are entirely membranous and transparent, in the genus *Holocompsa* the basal half is coriaceous and opaque, the apical half membranous and transparent, producing the appearance of the tegmen of a Heteropterous bug. Occasionally the tegmina are ciliated (*Polyphaga*, *Corydia*) or covered with a sericeous pile (*Nyctibora*, *Paratropes*). Four main nervures or veins issuing from the base of the tegmen may be distinguished, viz : 1. The mediastinal vein, which runs to the anterior border of the tegmen before its middle; the part of the tegmen between its anterior border and the mediastinal vein is known as the mediastinal area; branches or secondary veins are emitted by the mediastinal vein only towards the anterior border. 2. The radial vein extends to the apex of the tegmen dividing it into two more or less unequal parts, the marginal area and the discoidal area; in some genera the marginal area is almost equal in breadth to the discoidal area, in others it is a narrow strip; branches are given off to the anterior margin of the tegmen (costal veins) and sometimes to the apex. 3. The ulnar or median vein gives off a number of branches to the apex and to the sutural margin of the tegmen, when these branches unite in two main trunks they are termed the anterior ulnar or interno-median and the posterior ulnar or externo-median. 4. The anal vein runs in a curved line to the sutural margin at a point before its middle; it is usually well-marked and sometimes impressed; the part of the tegmen enclosed by it is the anal area, and is occupied by a series of more or less parallel secondary veins, known as the axillary veins, whose number ranges from three to twelve or more. These four main nervures are generally distinct, but in tegmina of corneous texture they tend to disappear; the secondary veins more frequently become obliterated.

The *wings* in some genera are reduced or absent, even when the tegmina are well-developed (*Phlebonotus*, *Phenacisma*), but reduction of the tegmina is always accompanied by reduction of the wings. The general form of the expanded wing is a triangle, the apex of the triangle being attached to the metanotum; an anterior part and a posterior part can be distinguished, the anal or dividing vein marking the division of the two parts. The veins of the tegmina have their counterpart in the wing; the ulnar vein nearly always is composed of two distinct branches, the anterior ulnar, which is usually unbranched, and the posterior ulnar, which gives off numerous branches towards the dividing vein and apex of the wing; the dividing vein is unbranched. The posterior part of the wing corresponds to the anal area of the tegmen and is traversed by several radiating axillary veins, which act like the ribs of a fan and on which this part of the wing can fold up, the folded up portion then doubling under the anterior part of the wing. In the Corydinæ the anal area however does not fold up like a fan, but merely doubles under the anterior part of the wing. A small part of the wing known as the triangular apical area occurs in some genera (e. g. *Ectobia*, *Chorisoneura*, *Oxyhaloa*); in these, when the wing is folded, this triangular area is left at the tip of the wing unincluded in the main fold, but it is doubled over or rolled up and lies on the anterior part of the wing, it also folds on itself along a longitudinal crease; when the wing is expanded this area unfolds and is seen to lie between the dividing vein and the posterior ulnar vein, which are often somewhat distorted to accomodate it. In the genera *Anaplecta* and *Plecloptera* the apical area is large and often equals the rest

of the wing in size, it now doubles by a transverse hinge over the rest of the wing and is also folded in two along a longitudinal crease; it is not veined. In the genus *Diploptera* the large apical area is veined in a complex manner, the venation however being quite separate from that of the basal part of the wing.

The *legs* are very similar to one another, no one pair being modified for leaping or for raptorial purposes; amongst the Panesthinæ they are well adapted for the fossorial habits of this sub-family. The coxæ are large and flattened and serve as shields to the ventral surface of the thorax. The trochanters are moderate in size. The femora are generally compressed, with the upper border rounded, the lower border with two keels; the presence or absence of spines on these keels is a character of great taxonomic importance. The tibiæ are heavily armed with spines. The tarsi are five-jointed, the last joint bearing two claws, between which may or may not be present a lobe or arolium; the under-surface of the other joints is generally furnished with pads or pulvilli and sometimes with spines; the first joint is the longest and is termed by most authors the metatarsus.

The *abdomen* is large and consists of ten segments, not all of which however are visible, since some of the apical segments are retracted and inflexed; in each segment a dorsal plate or tergum and a ventral plate or sternum is to be distinguished. The first dorsal plate is very reduced in size and is, as a rule, more or less fused with the metanotum; the first ventral plate may be still more rudimentary. In the male cockroach ten dorsal plates are usually visible, but sometimes only nine; in the female the eighth and ninth terga are concealed beneath the seventh tergum. The tenth dorsal plate is known as the lamina supra-analis, it is different in shape in the two sexes. Nine ventral plates in the male and seven in the female are visible, the last of the series (ninth in the male, seventh in the female) is termed the lamina subgenitalis and bears in the male a pair of unjointed styles; these however may be absent (*Ectobia, Panesthia* etc.), or only one may be present, a notch in the subgenital lamina replacing the absent one (*Phyllodromia, Temnopteryx*, etc.). In the females of the sub-family Periplanetinæ the hinder part of the seventh ventral plate is divided and modified to form a valvular apparatus, but in all the other sub-families the terminal ventral plate is a simple, semi-orbicular structure. The eighth, ninth and tenth sterna in the female can only be demonstrated by dissection. The tenth segment bears a pair of jointed cerci which may be very long or reduced to a single joint (*Panesthia*). In some species of the sub-families Ectobinæ and Phyllodrominæ, e. g. *Ectobia lapponica*, *Hololampra marginata*, *Phyllodromia incisa* etc., certain glands which appear to be confined to the male sex open to the exterior on the dorsal surface of the abdomen near its apex; the opening is situated as a rule between two terga, generally the seventh and eighth, and these terga are more or less modified. The function of the glands is quite obscure and the term « repugnatorial glands » applied to them by most authors seems singularly inappropriate. *Cosmozosteria ferruginea*, Walk. is said to extrude two bright orange-coloured vesicles from the extremity of the abdomen when irritated, and to emit a most disgusting odour. There are ten pairs of *spiracles*, two of which are thoracic, eight abdominal; the thoracic spiracles are situated between the bases of the legs, they are different in structure to the abdominal spiracles and may possibly be expiratory in their action, whilst the abdominal spiracles may be inspiratory. In some genera (*Epilampra, Rhicnoda* etc.) the terminal spiracles lie at the base of short spiracular tubes situated at the posterior angles of the ninth abdominal segment.

Reproduction. — The eggs are laid in a chitinous capsule or ootheca formed inside the body of the mother, who frequently carries it about for some days, protruding from the end of her abdomen, before she deposits it. A few species (*Molytria maculata, Epilampra burmeisteri, Panchlora viridis, Panesthia javanica* etc.) are viviparous. The larvæ are not very dissimilar from the adult, but are of course apterous; the larvæ of winged species can be distinguished by the produced posterior angles of the mesonotum and metanotum, but it is sometimes no easy matter to determine whether an example of an apterous form is immature or adult and no certain diagnostic characters can be offered.

Bionomics. — Very little is known as to the food of the majority of the species of Blattidæ; *Ectobia lapponica* in Northern Europe is said to feed largely on dried fish and Brunner states that dead animal matter is the natural food of this order of insects. The species found in human habitations are very catholic in their tastes and the Panesthinæ seem to derive nourishment from the decayed wood in which they burrow. Many species are nocturnal in their habits and the majority of species spend much of their life hidden under leaves and stones. The genera *Nocticola* and *Spelæoblatta* occur in caves; according to Bolivar these two genera constitute a separate sub-family the Nocticolinæ, but they may be regarded rather as aberrant members of the sub-family Periplanetinæ; the eyes are simple or absent in the three known species. Some species of minute cockroaches have been found in the nests of ants in North and South America and another species has been taken from the nest of a wasp of the genus *Polybia*, occuring in French Guiana. The apterous females of the genus *Rhicnoda* and the larvæ of some species of *Epilampra* are amphibious, diving and swimming with great readiness. Certain genera of the sub-family Perisphærinæ are remarkably like millipedes; *Eustegasta buprestoides* closely resembles a Buprestid beetle and some of the species of the genus *Prosoplecta* mimic Coccinellidæ and Galerucidæ; it has been stated by two independent observers that the South American *Achroblatta luteola* mimics the Lampyridæ. *Polyzosteria mitchellii* from Australia is most brilliantly coloured and is probably highly distasteful to insect enemies. *Gromphadorhina portentosa* from Madagascar is said to stridulate loudly, but no apparatus adapted for this purpose has yet been demonstrated.

Distribution.—Owing to human agency certain species (e.g. *Blatta orientalis, Periplaneta americana, Leucophæa surinamensis, Rhyparobia maderae*) have now a world-wide distribution and individuals of other exotic species are continually making an appearance at European ports, whither they have been transported by ships in the foreign trade. The geographical distribution of the different sub-families of Blattidæ will be noticed under their separate headings. The Blattidæ are of considerable geological antiquity as their remains have been found in abundance in beds of the Carboniferous period; a fragment which is considered by some authorities to be a portion of the tegmen of a cockroach has been found in a Silurian sandstone.

Classification. — Linnæus (1760-68) described twelve species of Blattidæ, ten of which were included in the genus *Blatta*; these have now been referred to eight genera and *orientalis* has been selected by almost universal consent as the type of the genus *Blatta*. Thunberg (1826), Serville (1831-39), Blanchard (1837), Burmeister (1839), Stâl (1856-61), de Saussure (1862) added considerably to our knowledge of this group of insects, but it was not till the appearance in 1865 of the *Nouveau Système des Blattaires* by Brunner von Wattenwyl that anything approaching a scientific classification of the Blattidæ was attempted. This classic was followed three years later by Francis Walker's *Catalogue of the Blattariæ in the British Museum*, in which a large number of new species were described; it is a sufficient commentary on the relative values of these two memoirs to state, that whilst the latter is practically useless to those who have not access to the actual specimens described, the former remains at the present day the most comprehensive and the most useful guide to the Blattidæ that is extant. Stâl (1874) submitted Brunner's scheme of classification to some criticisms, but was unable to improve on it to any great extent, and in 1893 Brunner in his final revision of the tribe left it with but few alterations of the first importance. The important memoirs of de Saussure, entitled *Mélanges Orthoptérologiques*, his account of the Orthoptera of Mexico and the memoirs by de Saussure and Zehntner on the Orthoptera of Madagascar and Central America have added so largely to our knowledge that it can be said that the study of the Blattidæ now rests on a sound basis of scientific classification. The *Synonymic Catalogue of Orthoptera* by Kirby, the two volumes of which have appeared recently, renders the task of the recorder much less difficult than in the past. The characters which are of chief value in distinguishing the sub-families of Blattidæ are, the

presence or absence of spines on the lower borders of the femora, the shape of the supra-anal lamina and of the sub-genital lamina in the female, the presence or absence of arolia between the tarsal claws, and the structure of the wings.

KEY TO THE SUB-FAMILIES

1. *Femora spined beneath.*
   2. *Last ventral segment of the female large, without valves.*
      3. *Supra-anal lamina of both sexes usually tranverse, narrow. Wings when present with an apical field, ulnar vein simple or bifurcate. Posterior femora usually sparsely armed with spines beneath.* . . 1. Subfam. Ectobinæ.
      3'. *Supra-anal lamina of both sexes more or less produced, triangular or emarginate. Wings when present with or without triangular apical field, ulnar vein ramose. Posterior femora usually strongly spined beneath.*
         4. *Supra-anal lamina of both sexes triangular, entire. Cerci projecting considerably beyond this lamina.*
            5. *Pronotum and tegmina smooth. The radial vein of the wings usually giving off to the anterior margin several parallel costal veins. Tarsi with no pulvilli.* . . . . . 2. Subfam. Phyllodrominæ.
            5'. *Pronotum and tegmina covered with a silky pile. The radial vein of the wings giving off to the anterior margin irregular costal veins. Tarsi provided with pulvilli.* . . . . 3. Subfam. Nyctiborinæ.
         4'. *Supra-anal lamina of the male more or less quadrate, with obtuse angles, of the female broadly rounded or lobate. Cerci not projecting beyond this lamina. Tarsi with distinct pulvilli. The ulnar vein of the wings emitting parallel branches towards the dividing vein* . . . . . 4. Subfam. Epilamprinæ.
   2'. *The last ventral abdominal segment of the female provided with valves* . 5. Subfam. Periplanetinæ.
1'. *Femora unarmed beneath (A few exceptions).*
   2. *Supra-anal lamina of both sexes more or less produced, its posterior margin notched.*
      3. *Claws with a distinct arolium* . . . . . 6. Subfam. Panchlorinæ.
      3'. *Claws without or with a minute arolium.*
         4. *Wings with a folded fan-like anal field. Pronotum smooth* . . 7. Subfam. Blaberinæ.
         4'. *Anal field of the wings with a single fold. Pronotum more or less prose* . . . . . 8. Subfam. [illegible].
   2'. *Supra-anal lamina of both sexes short, transverse, its posterior margin straight or rounded.*
      3. *Subgenital lamina of the male somewhat produced, furnished with a single style. Claws with a distinct arolium (except in the genus* Paranauphœta).
         4. *Anterior part of the wings pointed, or the wings with much produced apical field, or wings twice as long as elytra, folded in repose* . . . . . 9. Subfam. Oxyhaloinæ.

4'. *Anterior part of the wing rounded, with no apical field* . . . 10. Subfam. PERISPHÆRINÆ.
3'. *Subgenital lamina of the male very small, with no styles. Claws with no arolia* . . . . . 11. Subfam. PANESTHINÆ.

SUBFAM. ECTOBINÆ

Characters. — Antennæ setaceous or plumose. Tegmina of horny texture or coriaceous, fully developed, scale-like or absent. Wings, when present, with prominent triangular apical field or with a large reflected and folded apical area, the ulnar vein simple or bifurcate except in the genus *Anaplectoidea* where it is ramose. Legs slender, femora usually sparsely armed beneath. Supra-anal lamina of both sexes various in shape but typically narrow and transverse. Ootheca with a longitudinal crest and before deposition carried with the crest uppermost and the eggs disposed vertically(1).

KEY TO THE GENERA

1. *Wings fully developed.*
2. *Wings with triangular apical field.*
3. *Radial and ulnar veins of tegmina separate.*
4. *Sub-genital lamina of male without modified appendages.*
5. *Pronotum and tegmina not pubescent.*
6. *Antennæ setaceous, posterior ulnar vein of tegmina flexuose* . . . . . Genus THEGANOPTERYX, Brunner.
6'. *Antennæ more or less plumose, posterior ulnar vein of tegmina angulate* . . . . . Genus HEMITHYRSOCERA, Saussure.
5'. *Pronotum and tegmina pubescent* . . . . . Genus MALLOTOBLATTA, Saussure & Zehntner.
4'. *Sub-genital lamina of male with lobiform or hook-like appendages* . . . . . Genus ESCALA, Shelford.
3'. *Radial and ulnar veins of tegmina fused together at their bases* . . . . . Genus ECTOBIA, Stephens.
2'. *Wings with large reflected apical area.*
3. *Ulnar vein of wings simple or bifurcate* . . . . . Genus ANAPLECTA, Burmeister.
3'. *Ulnar vein of wings ramose* . . . . . Genus ANAPLECTOIDEA, Shelford.
1'. *Wings rudimentary or absent* . . . . . Genus HOLOLAMPRA, Saussure.

1. GENUS ECTOBIA, STEPHENS

Ectobia. Stephens, Ill. Brit. Ent. Mandib. Vol. 6. p. 45 (1835).

Characters. — Antennæ setaceous. Tegmina when folded not covering the scutellum, the radial and ulnar veins fused at their bases. Triangular apical field of the wings conspicuous. Femora

(1) This character appears also amongst certain genera of *Phyllodromiae*, e. g. *Ellipsidion*, Saussure.

with two spines on the anterior margin beneath. Supra-anal lamina in both sexes transverse and narrow. Sub-genital lamina of male without styles.

Geographical distribution of species. — Europe, North America, Africa, Australia.

1. *E. lapponica*, Linnaeus, Syst. Nat. (ed. 10), p. 425, n. 8 (1758) (British Islands, N. Europe, Mountains of S. Europe, Servia). — **Plate, Fig. 3, 8a, 8b.**
2. *E. albicincta*, Brunner von Wattenwyl, Verh. Zool.-Bot. Ges. Wien, Vol. 11, p. 98, 286 (1801) (Dalmatia, Tuscany).
3. *E. nicæensis*, Brisout, Bull. Soc. Ent. Fr. (2), Vol. 10, p. 68 (1852) (S. France, Spain, Tyrol).
   ? *tridentina*, Targioni-Tozzetti, Bull. Soc. Ent. Ital. Vol. 13, p. 180 (1881).
4. *E. Panzeri*, Stephens, Illustr. Brit. Ent. Mand. Vol. 6, p. 47, n. 5 (1835) (British Islands, N. Europe, Spain, Dalmatia).
5. *E. perspicillaris*, Herbst, Fuessly, Arch. Ent. p. 186, pl. 49, f. 11 (1786) (British Islands, S. and Mid-Europe, Algeria). — **Plate, Fig. 7.**
   livida, Fabricius, Ent. Syst. Vol. 2, p. 10, n. 23 (1793).
   Brunneri, Scoane, Mitt. Schweiz. Ent. Ges. Vol. 5, p. 485 (1879).
6. *E. vittiventris*, Costa, Ann. Acad. Asp. Nat. Vol. 1, p. 111 (1847) (Italy, Spain, Algeria, Cape of Good Hope).
7. *E. Duskei*, Adelung, Hor. Soc. Ent. Ross. Vol. 38, p. 127 (1904) (Mid-Russia).
8. *E. africana*, Saussure, Abh. Senckenb. Ges. Frankf. Vol. 21, p. 569 (1899) (E. Africa).
9. *E. flavocincta*, Scudder, Journ. Boston Soc. Nat. Hist. Vol. 7, p. 419, n. 3 (1862) (W. United States, N. America).
10. *E. apicifera*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 35 (1893) (S. Australia).
11. *E. minima*, Tepper, ibidem, Vol. 19, p. 147 (1895) (Victoria, Australia).
12. *E. sublucida*, Tepper, ibidem, p. 147 (1895) (Victoria, Australia).
13. *E. tasmanica*, Brancsik, Jahresb. Ver. Trencsin. Comit. Vol. 19, p. 244, pl. 7, f. 1 (1897) (Tasmania).
14. *E. maori*, Rehn, Proc. U. S. Nat. Mus. Vol. 27, p. 541 (1904) (New Zealand).

Doubtful species :

15. *E.* (?) *marcida*, Erichson, Arch. f. Naturg. Vol. 8, p. 248 (1842) (Tasmania).
16. *E.* (?) *margarita*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 148 (1895) (Victoria, Australia).

2. Genus THEGANOPTERYX, Brunner von Wattenwyl

Theganopteryx. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 53 (1865).

Characters. — Allied to *Ectobia*, Westwood, but the radial and ulnar veins of the tegmina separate; triangular apical field of the wings generally smaller. Ulnar vein of the wings simple or bifurcate. Femora with numerous spines. Supra-anal lamina transverse or produced and triangular. Sub-genital lamina of the male with or without styles.

Geographical distribution of species. — Tropical Asia and Africa, Central and South America, (?) Australia.

1. *T. apicigera*, Walker, Cat. Blatt. Brit. Mus. p. 227 (1868) (Borneo, Sumatra, Java).
2. *T. parvula*, Walker, Cat. Blatt. Brit. Mus. p. 108 (1868) (India).
3. *T. senegalensis*, Saussure, Rev. Zool. (2), Vol. 20, p. 354 (1868) (Senegal, Sierra Leone).
   Blatta fulvipes, Walker, Cat. Blatt. Brit. Mus. p. 105 (1868).
   Blatta amœna, Walker, ibidem, p. 220 (♂) (1868).
4. *T. gambiensis*, Shelford, Trans. Ent. Soc. Lond. p. 230 (1906) (Gambia).
5. *T. aethiopica*, Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 72 (1895) (Gold Coast). — **Plate, Fig. 1.**
6. *T. nitida*, Borg, Bih. Svenska, Akad. Vol. 18, Afd. 5, n. 10, p. 4, pl. 1, f. 8 (1904) (Cameroons).

7. *T. Saussurei,* nom. nov., Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 71(1895) (Somaliland).
8. *T. vinula,* Stâl, Öfv. Vet.-Akad. Förh. Vol. 13, p. 166 (1865) (Natal).
9. *T. massuae,* Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 28 (1895) (E. Africa).
10. *T. hova,* Saussure & Zehntner, ibidem, p. 7, n. 1 (1895) (Madagascar).
11. *T. malagassa,* Saussure & Zehntner, ibidem, p. 8, n. 2 (1895) (Madagascar).
12. *T. tricolor,* Saussure & Zehntner, ibidem, p. 9, n. 3, pl. 1. f. 2 (1895) (Madagascar).
13. *T. conspersa,* Saussure, Soc. Ent. Zurich, Vol. 6, p. 26 (1891) (Madagascar).
14. *T. bidentata,* Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 11, pl. 1. f. 1, 1*a*, *d* (1895) (Madagascar).
15. *T. molesta,* Saussure & Zehntner, ibidem, p. 12, n. 6 (1895) (Madagascar).
16. *T. punctulata,* Saussure & Zehntner, ibidem, p. 15, n. 10 (1895) (Madagascar).
17. *T. punctata,* Saussure, Soc. Ent. Zurich, Vol. 6, p. 26 (1891) (Madagascar).
18. *T. difficilis,* Saussure, Abh. Senckenb. Ges. Frankf. Vol, 21, p. 572 (1899) (Madagascar).
19. *T. fallax,* Saussure, Mém. Soc. Sc. Phys. Nat. Genève. Vol 20, p. 233 (1869) (Mexico).
20. *T. pilosella,* Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 17, n. 2 (1893) (Peru).
21. *T. lucida,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 62 (1865) (?Australia).

3. Genus HEMITHYRSOCERA, Saussure

Hemithyrsocera. Saussure, Soc. Ent. Zurich. Vol. 8, p. 57 (1893).

Characters. — Antennæ more or less incrassated and pilose. Anterior ulnar vein of the tegmina bifurcated, branches of posterior ulnar vein angulate. Ulnar vein of the wings simple or bifurcate, a conspicuous triangular apical field. Femora strongly spined in some species. Supra-anal lamina more or less produced and triangular.

Geographical distribution of species. — Tropical Asia.

1. *H. histrio,* Burmeister, Handb. Ent. Vol. 2, p. 490 (1838) (Great Sunda Islands, Penang, Celebes).
   Blatta lateralis, Serville, Hist. Ins. Orth. p. 107 (1839).
   Phyllodromia inversa, Brunner von Wattenwyl. Nouv. Syst. Blatt. p. 96 (1865).
   Pseudomops fissa, Walker, Cat. Blatt. Brit. Mus. p. 213 (1868).
   Theganopteryx jucunda, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 232 (1869).
   Thyrsocera lineaticollis, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 19, p. 302 (1890).
2. *H. nigra,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 120, n. 5 (1865) (India, China, Indo-China).
   Ellipsidium subcinctum, Walker. Cat. Blatt. Brit. Mus. p. 85, n. 5 (1868).
   Theganopteryx indica, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 230, pl. 3, f. 16 (1869).
3. *H. soror,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 120, n. 6 (1865) (Java).
4. *H. suspecta,* Bolivar, Ann. Soc. Ent. Fr. p. 288 (1897) (India).
5. *H. ferruginea,* Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 22, pl. 1, f. 6 (1893) (Burma).
6. *H. communis,* Brunner von Wattenwyl, ibidem, p. 23 (1893) (Burma).
7. *H. lateralis,* Walker, Cat. Blatt. Brit. Mus. p. 213 (1868) (Burma, Siam, India). — **Plate, Fig. 2.**
   Thysocera major, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 22, pl. 1, f. 7 (1893).
8. *H. ignobilis,* Shelford, Trans. Ent. Soc. Lond. p. 238 (1906) (Assam).
9. *H. vittata,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 119, n. 4 (1865) (Cambodia).

Doubtful species :

10. *H. tessellata,* Rehn, Proc. U. S. Nat. Mus. Vol. 27, p. 545 (1904) (Siam).
11. *H. australis,* Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 153 (1895) (N. Queensland).

4. Genus MALLOTOBLATTA, Saussure & Zehntner

Mallotoblatta. Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 17, 41 (1895).

Characters. — Small slender insects with the head, pronotum and tegmina furnished with a scattered erect pubescence. Tegmina and wings in the male longer than the abdomen, wings with an intercalated apical triangle and simple or bifurcated ulnar vein; in the female the tegmina are not longer than the abdomen, the wings are abbreviated. Femora strongly spined. Supra-anal lamina in the male transverse or slightly produced, trigonal in the female.

Geographical distribution of species. — Madagascar, East Africa, India.

1. *M. pubescens*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. p. 42, pl. 2, f. 19 (1895) (Madagascar).
2. *M. pilosella*, Saussure & Zehntner, in Grandidier, ibidem, p. 44, pl. 2, f. 20, 20*a* (1896) (Madagascar).
3. *M. brachyptera*, Adelung, Ann. Mus. Zool. St-Pétersb. Vol. 8, p. 303, pl. 20, f. 13 (1904) (Abyssinia).
4. *M. Kraussi*, Adelung, ibidem, Vol. 9, f. 12 (1905) (Abyssinia).
5. *M. obscura*, Shelford, Trans. Ent. Soc. Lond. p. 234 (1906) (India, Madras).

5. Genus ESCALA, Shelford

Escala. Shelford, Trans. Ent. Soc. Lond. p. 238 (1906).

Characters. — Allied to *Thegaonopteryx*, Br., but the sub-genital lamina of the male bearing an asymmetrical lobe which may be unarmed or armed with a series of hooks or replaced by a single stout hook; the right style sometimes absent, the left style acuminate. Supra-anal lamina produced, triangular, not projecting beyond the sub-genital lamina. Cerci elongate. Wings with median and ulnar veins simple, triangular apical field somewhat inconspicuous.

Geographical distribution of species. - India, Australia.

1. *E. circumducta*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 142 (1869) (Adelaide, S. Australia).
   Plate, Fig. 9.
   circumducta, Shelford, Trans. Ent. Soc. Lond. p. 239, pl. 15, f. 4.
2. *E. longiuscula*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 143 (1869) (Adelaide, S. Australia).
   longiuscula, Shelford, Trans. Ent. Soc. Lond. p. 239, pl. 15, f. 5.
3. *E. insignis*, Shelford, Trans. Ent. Soc. Lond. p. 240, pl. 15, f. 6 (1906) (Australia).
4. (?) *E. subcolorata*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 32 (1871) (India, Bombay).

6. Genus ANAPLECTA, Burmeister

Anaplecta. Burmeister, Handb. Ent. Vol. 2, p. 494 (1838).
Riatia. Walker, Cat. Blatt. Brit. Mus. p. 66 (1868).

Characters. — Antennæ setaceous; pronotum transversely elliptical. Tegmina generally with discoidal area traversed by longitudinal veins. Wings with ulnar vein simple or bifurcate, provided with a large triangular apical area which, in a state of repose, is folded longitudinally and then reflected over the rest of the wing, it is without veins. Legs as in *Ectobia*, Westwood. Supra-anal lamina slightly produced, triangular or trigonal. Sub-genital lamina of males without styles.

Geographical distribution of species. — Tropical Asia and Africa, Central and South America, Australia.

1. *A. subrotundata*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 26 (1871) (Bombay, India).

2. *A. fulva*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 12 (1893) (Burma).
3 *A. gyrinoides*, Walker, Cat. Blatt. Brit. Mus. p. 97, n. 64 (1868) (Ceylon).
A. maculata, Shelford, Trans. Ent. Soc. Lond. p. 240, pl. 15, f. 7 (1906) Ceylon).
5. *A. zeylanica*, Shelford, ibidem, p. 241, pl. 15, f. 8 (1906) (Ceylon).
6. *A. Thwaitesi*, Shelford, ibidem, p. 241, pl. 15, f. 9 (1906) (Ceylon).
A. malayensis, Shelford, ibidem, p. 242, pl. 15, f. 10 (1906) (Malay Peninsula).
8. *A. obscura*, Shelford, ibidem, p. 242, pl. 15, f. 12 (1906) (Malay Peninsula).
9. *A. javanica*, Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 71 (1895) (Java).
10. *A. borneensis*, Shelford, Trans. Ent. Soc. Lond. p. 242, pl. 13, f. 11 (1906) (Borneo).
11 *A. cincta*, Gerstäcker, Mitt. Ver. Vorpomm. Vol. 14, p. 56 (1883) (Ogowe, W. Africa).
12. *A. dahomensis*, Shelford, Trans. Ent. Soc. Lond. p. 244, pl. 16. f. 2 (1906) (Dahomey, W. Africa).
13. *A. pulchra*, Shelford, ibidem, p. 244 (1906) (Fernando-Po).
14. *A. africana*, Saussure, Ann. Mus. Stor. Nat. Genova, Vol 35, p. 70 (1895) (E. Soudan).
15. *A. mexicana*, Saussure. Rev. Zool. (2), Vol. 20, p. 97 (1868) (Mexico).
16. *A. nahua*, Saussure, ibidem, p. 354 (1868) (Mexico).
17. *A. tolteca*, Saussure, ibidem, p. 354 (1868) (Mexico).
18. *A. otomia*, Saussure. Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 238, pl. 3, f. 18 (1869) (Mexico).
19. *A. azteca*, Saussure, Rev. Zool. (2), Vol. 20, p. 97 (1868) (Mexico).
20. *A. albomarginata*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 26, n. 12 (1893) (Mexico).
21. *A. parvipennis*, Saussure & Zehntner, ibidem, p. 26, n. 13 (1893) (Mexico).
22. *A. decipiens*, Saussure & Zehntner, ibidem, p. 27, n. 16, pl. 3, f. 5, pl. 6, f. 10, 11 (1893) (Mexico).
23. *A. flabellata*, Saussure & Zehntner, ibidem, p. 29, pl. 3, f. 1, pl. 4, f. 13, 14 (1893) (Mexico to Panama).
24. *A. fulgida*, Saussure, Rev. Zool. (2), Vol. 14, p. 163 (1862) (Mexico, Guatemala).
25. *A. fallax*, Saussure, ibidem, p. 163 (1862) (Mexico, Guatemala, Colombia).
26. *A. domestica*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 26, n. 14 (1893) (Guatemala).
27. *A. elliptica*, Saussure & Zehntner, ibidem, p. 27, n. 17, pl. 3, f. 2, pl. 4, f. 8 (1893) (Guatemala).
28. *A. Dohrniana*, Saussure & Zehntner, ibidem, p. 28, n. 18, pl. 3, f. 3, pl. 4, f. 15 (1893) (Guatemala).
29. *A. Jansoni*, Saussure & Zehntner, ibidem, p. 29, n. 20, pl. 3, f. 4, pl. 4, f. 9 (1893) (Nicaragua).
30. *A. dorsalis*, Burmeister, Handb. Ent. Vol. 2, p. 494, n. 3 (1838) (Porto Rico).
31. *A. minutissima*, De Geer, Mém. Ins. Vol. 3, p. 542, n. 10, pl. 44, f. 13, 14 (1773) (Surinam).
31. *A. pallida*, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 10, p. 463 (1881) (Ecuador).
33. *A. pavida*, Shelford, Trans. Ent. Soc. Lond. p. 245, pl. 16, f. 3 (1906) (Ecuador).
34. *A. fusca*, Shelford, ibidem, p. 246, pl. 16, f. 4 (1906) (Ecuador).
35. *A. varipennis*, Shelford, ibidem, p. 246, pl. 16, f. 5, 6 (1906) (Ecuador). — **Plate, Fig. 5, 6, 6a.**
36. *A. peruviana*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 23, n. 2 (1893) (Peru).
37. *A. moxa*, Saussure & Zehntner, ibidem, p. 23, n. 5, pl. 4, f. 3, 4 (1893) (Peru).
38. *A. alaris*, Saussure & Zehntner, ibidem, p. 27, n. 15 (1893) (Peru).
39. *A. lateralis*, Burmeister, Handb. Ent. Vol. 2, p. 494, n. 2 (1838) (Colombia, Brazil).
40. *A. bivittata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 63, n. 2 (1865) (Brazil).
41. *A. unicolor*, Burmeister, Handb. Ent. Vol. 2, p. 494, n. 4 (1838) (Colombia).
42. *A. replicata*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 25, n. 10, pl. 4, f. 12 (1893) (Brazil).
43. *A. grandipennis*, Saussure & Zehntner, ibidem, p. 25, n. 11, pl. 4, f. 5 (1893) (Brazil).
44. *A. Brunneri*, Shelford, Trans. Ent. Soc. Lond. p. 245, pl. 16, f. 1 (1906) (Brazil).
45. *A. pallicornis*, Walker, Cat. Blatt, Brit. Mus. p. 66 (1868) (Brazil). — **Plate, Fig. 4.**
46. *A. chrysoptera*, Shelford, Trans. Ent. Soc. Lond. p. 247, pl. 16, f. 7 (1906) (Brazil).
47. *A. platycephala*, Rehn, Proc. U. S. Nat. Mus. Vol. 27, p. 542 (1904) (Queensland).

7. Genus ANAPLECTOIDEA, Shelford

Anaplectoidea. Shelford, Trans. Ent. Soc. Lond. p. 247 (1906).

Characters. — Allied to *Anaplecta*, Burmeister, but with the ulnar vein of the wings ramose; tegmina with the marginal field very broad, ulnar vein with six branches. Legs strongly spined.

Geographical distribution of species. — Celebes, Batchian and Sangir.

1. *A. nitida*, Shelford, Trans. Ent. Soc. Lond. p. 248, pl. 16, f. 8, 9 (1906) (Celebes and Batchian).
2. *A. Dohertyi*, Shelford, Ann. Mag. Nat. Hist. Lond. (7), Vol. 19, p. 25 (1907) (Sangir).

8. Genus HOLOLAMPRA, Saussure

Hololampra. Saussure, Mém. Blatt. Mex. p. 94 (1864).
Aphlebia. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 66 (1865).

Characters. — Tegmina of horny texture, as long as the body or abbreviated, veins indistinct. Wings rudimentary or absent. Femora sparsely armed with spines. Supra-anal lamina short transverse in both sexes. Abdomen dilated in the female.

Geographical distribution of species. — Europe, Atlantic Islands, N. Africa, Asia minor, Turkestan, Madagascar, West-Indies.

1. *H. marginata*, Schreber, Naturf. Vol. 15, p. 88, pl. 3, f. 16 (1781) (S. Europe).
2. *H. maculata*, Schreber, ibidem, p. 89, pl. 3, f. 17, 18 (1781) (Germany, Austria).
3. *H. punctata*, Charpentier, Hor. Ent. p. 77 (1825) (S. Europe).
4. *H. sardea*, Serville, Hist. Ins. Orth. p. 112 (1839) (Sardinia, Algeria).
5. *H. pallida*, Brunner von Wattenwyl, Prodr. Eur. Orth. p. 42, n. 5 (1882) (Greece, Asia minor).
6. *H. trivittata*, Serville, Hist. Ins. Orth. p. 106 (1839) (Sardinia, Algeria, Spain).
7. *H. brevipennis*, Fischer, Orth. Europ. p. 102, pl. 7, f. 12 (1853) (Tyrol, Carniola, Istria, Servia).
8. *H. graeca*, Brunner von Wattenwyl, Prodr. Eur. Orth. p. 43, n. 8 (1882) (Greece, Asia minor).
9. *H. virgulata*, Bolivar, Ann. Soc. Ent. Belg. Vol. 21, p. 67 (1878) (Portugal).
10. *H. carpetana*, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 2, p. 214, pl. 9, f. 1 (1873) (Spain). — Plate, Fig. 10.
11. *H. subaptera*, Rambur, Faune Andal. Vol. 2, p. 14 (1838) (Spain, Corsica, Dalmatia, Sicily).
12. *H. polita*, Krauss, Verh. Zool.-Bot. Ges. Wien, Vol. 38, p. 569, pl. 15, f. 2, 2*a* (1888) (West Caucasus).
13. *H. adusta*, Fischer, Orth. Eur. p. 355 (1846) (Crimea).
14. *H. Retowskii*, Krauss, Verh. Zool.-Bot. Ges. Wien, Vol. 38, p. 570, pl. 15, f. 3, 3*a* (1888) (Crimea).
15. *H. infumata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 68 (1865) (Madeira).
16. *H. bivittata*, Brullé, in Webb & Berthelot, Hist. Canar. Ins. p. 75, pl. 5, f. 1 (1844) (Canaries).
17. *H. algerica*, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 10, p. 499 (1881) (Oran, Tangiers).
18. *H. moghrebica*, Bolivar, ibidem, Vol. 16, p. 89, pl. 4, f. 1 (1887) (Morocco).
19. *H. larrinuae*, Bolivar, ibidem, Vol. 10, p. 590 (1881) (Algeria, Tunis, Crimea).
20. *H. Janeri*, Bolivar, ibidem, p. 83 (1894) (Tangiers).
21. *H. Cazurroi*, Bolivar, Le Naturaliste, Vol. 3, p. 116 (1885) (Morocco).
22. *H. Cecconii*, Griffini, Bol. Mus. Zool. Torino, Vol. 10 (193), p. 1 (1895) (Candia).
23. *H. Chavesi*, Bolivar, Act. Soc. Esp. Hist. Nat. p. 72 (1898) (Azores).
24. *H. bætica*, Bolivar, C. R. Soc. Ent. Belg. Vol. 28, p. 105 (1884) (Spain).
25. *H. tartara*, Saussure, in Fedtschenko, Reise in Turkestan, Orth. p. 7, pl. 1, f. 4 (1874) (Turkestan).
26. *H. madecassa*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 238, pl. 3, f. 19, 19*a* (1869) (Madagascar).
27. *H. minuta*, Shelford, Ann. Mag. Nat. Hist. Lond. (7), Vol. 19, p. 25 (1907) (Madagascar).
28. *H. inusitata*, Rehn, Bull. Amer. Mus. Nat. Hist. Vol. 22, p. 113 (1906) (Bahamas).

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EXPLANATION OF THE PLATE

Fig. 1. *Theganopteryx aethiopica*, Saussure.
— 2. *Hemithyrsocera lateralis*, Serville.
— 3. Abdomen of *Ectobia lapponica*, Linnæus, ♂, dorsal view.
— 4. *Anaplecta pallicornis*, Walker.
— 5. — *varipennis*, Shelford.
— 6. *a*, *b*. Wings of *Anaplecta varipennis*, Shelford.
— 7. *Ectobia perspicillaris*, Herbst.
— 8. *a*. Tegmen of *Ectobia lapponica*, Linnæus.
b. Wing » » »
— 9. End of abdomen of *Escala circumducta*, Walker, ♂, dorsal view.
— 10. *Hololampra carpetana*, Bolivar.

Oxford, February 15, 1907.

4

Anaplecta pallicornis

Anaplecta varipennis

Hemithyrocera lateralis

6a

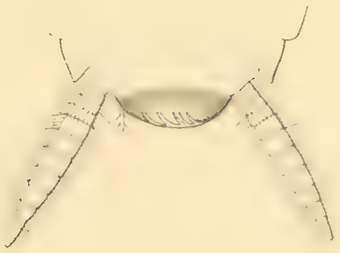
5

Ectobia lapponica

6b

Anaplecta varipennis

9



Escala circumducta

Ectobia lapponica

7

Ectobia pirspicillaris

Hololampra carpetana

Theganopteryx aethiopica

FAM. BLATTIDÆ

SUBFAM. ECTOBINÆ

FAM. BLATTIDÆ

SUBFAM. ECTOBINÆ

ERRATA AND ADDENDA

An examination of a considerable number of types enables me to make the following corrections and additions in my list of the species of the Subfamily Ectobiinæ :

Genus **Ectobia.**

delete *E. flavocincta*, Scudder [= *Ischnoptera pensylvanica*, De Geer].
E. africana, Saussure, to be transferred to *Theganopteryx*.

Genus **Theganopteryx.**

delete *T. punctulata*, Saussure & Zehntner [= *Phyllodromia*].
add *T. circumcincta*, Reiche & Fairmaire, in Ferret & Galinier, Voy. Abyss. Vol. 3, p. 421, pl. 27, f. 3 (1847) (Abyssinia).
add *T. pulchella*, Gerstäcker, Mitth. Ver. Vorpomm. Vol. 14, p. 61 (1883) (Cameroons).
add *T. parilis*, Walker, Cat. Blatt. Brit. Mus. p. 110 (1865) (Hong-Kong).
add ? *T. sabauda*, Giglio-Tos, Boll. Mus Zool. Univ. Torino, Vol. 22, n. 556, p. 2 (1907) (Uganda).

Genus **Hemithyrsocera.**

H. nigra, Brunner von Wattenwyl, is synonymous with *H. palliata*, Fabricius, Ent. Syst. Suppl. p. 186 (1798).

Genus **Escala.**

add *Ischnoptera annulata*, Tepper, Trans. Roy. Soc. S. Australia, Vol. 17, p. 51 (1893) as a synonym of *Escala circumducta*, Walker.

Genus **Anaplecta.**

delete *A. minutissima*, De Geer [= *Holocompsa*].
add [1]*A. pumila*, Stål, Freg. Eugen. Resa, Ent. p 309 (1858) (Brazil).
add *A. abortiva*, Caudell, Bull. Mus. Brooklyn Inst. Vol. 1, p. 105 (1904) (Brownsville, U. S. A.).
add *A. pulchella*, Rehn, Proc. Acad. Nat. Sc. Philad. p. 262 (1906) (Demerara).

Genus **Hololampra.**

delete *H. madecassa*, Saussure [= *Ceratinoptera*].
add *H. misella*, Stål, Oefv. Vet. Akad. Förh. Vol. 13, p. 166 (1856) (Natal).

GENUS PHORTICOLEA, BOLIVAR

Phorticolea. Bolivar, Mitt. Schweiz. Ent. Ges. Vol. 11, p. 138 (1905).

Characters. — Apterous, pubescent. Eyes small, remote. Antennæ with basal third incrassate, hirsute. Pronotum anteriorly rounded, almost covering vertex of head, posteriorly truncate. Penultimate

(1) Possibly conspecific with *A. lateralis*, Burmeister.

abdominal tergite in ♀ tumid in middle, posterior margin bisinuate, in ♂ posterior margin produced in the middle. Supra-anal lamina of ♀ transverse. Sub-genital lamina of ♂ small, provided with two styles. Femora compressed, front pair fimbriated beneath, posterior pair shortly spinose towards apex. Tibiæ very spinose. Tarsi elongate, arolium present between tarsal claws.

Geographical distribution of species. — Brazil.

1. *P. testacea*, Bolivar, Mitt. Schweiz. Ent. Ges. Vol. 2, p. 139 (1905) (Rio Grande do Sul, in ant's nests).

Oxford, May 15th 1908.

73me FASCICULE ORTHOPTERA

GENERA INSECTORUM

DIRIGÉS PAR

P. WYTSMAN

ORTHOPTERA

FAM. BLATTIDÆ

SUBFAM. PHYLLODROMIINÆ

by R. SHELFORD

1908

PRIX : FR. 10.55

On souscrit chez M. P. Wytsman, Zoologiste, 43, rue Saint-Alphonse, à Bruxelles
Prospectus gratis et franco sur demande.

ORTHOPTERA

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by R. SHELFORD

WITH I COLOURED AND I PLAIN PLATE

The subfamily Phyllodromiinæ forms the second division of the family of Blattidæ.

Characters. — Antennæ setaceous or plumose. Head with the vertex more or less exposed. Scutellum sometimes exposed. Tegmina coriaceous or corneous, fully developed, reduced or scale-like. Wings fully developed, reduced or absent, costal veins generally numerous, regular, parallel, rarely with a small triangular apical field, never with a large folded and reflected apical area, ulnar vein with few exceptions ramose. Legs slender; femora generally strongly spined beneath, tarsi without pulvilli; an arolium nearly always present between the tarsal claws. Supra-anal lamina of both sexes of diverse shapes but typically produced and triangular; subgenital lamina of male with styles, one of which may be absent. Ootheca various in form, in some genera similar to that of the Ectobiinæ, in others coriaceous, carried by the female with the suture directed to one side and deposited only a few hours before the emergence of the larvæ.

This subfamily on account of the ill-defined genera and the enormous number of species presents more difficulties to the systematist than any other of the group. In the accompanying synoptical key to the genera I have ventured to introduce some modifications of the systems drawn up by previous authorities, but I have no great confidence in the permanency of my present views, nor any belief that the key is less artificial than its predecessors. The genus *Temnopteryx* cannot well be separated from the genus *Ceratinoptera* and I expect that eventually it will be found necessary to merge them. The genus *Phyllodromia* comprising more than 150 species is so unwieldy that its subdivision is a consummation devoutly to be hoped for, but such efforts as have been made are not successful and have led merely to the erection of more ill-defined and highly artificial genera; *Onychostylus, Desmosia, Mareta* are cases in point and the last I have merged in *Phyllodromia* seeing that it is founded on a character shewn by more

than one species in other genera of the subfamily. The genus *Nothoblatta* of Bolivar does not seem to be a Phyllodromine as suggested, for the femora are entirely unarmed beneath. Both *Ellipsidion* and *Ischnoptera* grade into *Phyllodromia* in the most confusing manner. To add to the perplexities of the systematic worker in this group, the subfamily itself is not well-marked off from the Ectobiinæ. The characters presented by the wing-venation, the armature of the femora and the form of the supra-anal lamina are most untrustworthy guides on account of the protean variation that they exhibit. In a previous communication (Trans. Ent. Soc. Lond. p. 231, 1906) I expressed the view that the only crucial difference between the two subfamilies was the ramose ulnar vein of the wings in the Phyllodromiinæ and the simple ulnar vein in the Ectobiinæ, but even this character is unreliable, for in *Ceratinoptera*, a characteristic Phyllodromiine genus, as shewn by the membranous ootheca of some species, the ulnar vein of the wing is simple. To put the matter briefly, this subfamily is full of interest for the evolutionist, but it is the despair of the systematist.

KEY TO THE GENERA

1. *Eyes well-developed.*
2. *Eyes not joined on vertex of the head.*
3. *Genital styles of male not bifurcate at apex.*
4. *Arolia present between the tarsal claws.*
5. *Tegmina exceeding the apex of the abdomen, usually considerably so.*
6. *Ulnar veins of tegmina angulate. (Antennæ incrassated and plumose).*
7. *Anterior ulnar vein of tegmina simple* . . . . . 1. Genus Pseudomops, Serville.
7′. *Anterior ulnar vein of tegmina biramose* . . . . . 2. Genus Pseudothyrsocera, Shelford.
6′. *Ulnar veins of tegmina not angled* (1).
7. *Ulnar vein of wings sending branches to dividing vein.*
8. *Antennæ incrassated and hirsute.*
9. *Pronotum discoidal, mid- and hind-femora unarmed* 9. Genus Caloblatta, Saussure.
9′. *Pronotum trapezoidal, mid- and hind-femora armed* 10. Genus Pseudischnoptera, Saussure.
8′. *Antennae not incrassated nor hirsute.*
9. *Femora strongly armed beneath* . . . . . 5. Genus Ischnoptera, Burmeister.
9′. *Femora weakly armed beneath.*
10. *Tegmina narrow, overlapping considerably* . . . 7. Genus Chrastoblatta, Saussure & [Zehntner.
10′. *Tegmina broad, not overlapping considerably* . . 8. Genus Piroblatta, Shelford.
7′. *Ulnar vein of wings not sending branches to dividing vein.*
8. *Antennæ incrassated and hirsute.*
9. *Tegmina corneous, their venation obscured* . . . . 3. Genus Pachnepteryx, Brunner von [Wattenwyl.
9′. *Tegmina coriaceous, their venation not obscured* . . 4. Genus Ellipsidion, Saussure.
8′. *Antennæ not incrassated nor hirsute.*
9. *Head very broad.*
10. *Anterior field of tegmina very broad* . . . . . 18. Genus Macrophyllodromia, Saussure [& Zehntner.

(1) Except in a few species of *Ischnoptera*.

10'. *Anterior field of tegmina not broad* . . . . . 17. Genus PSEUDOPHYLLODROMIA, Brunner
9'. *Head not very broad.* [von Wattenwyl.
10. *Maxillary palpi enormous* . . . . . 12. Genus DURYODANA, Kirby.
10'. *Maxillary palpi not large.*
11. *Convex insects.* . . . . . 16. Genus LIOSILPHA, Stål.
11'. *Depressed insects.*
12. *Apical triangle of wings prominent* . . . . 15. Genus LUPPARIA, Walker.
12'. *Apical triangle of wings not prominent, or absent* 11. Genus PHYLLODROMIA, Serville.
5. *Tegmina if present not exceeding the apex of the abdomen.*
6. *Tegmina as long as, or shorter than the abdomen, not lobiform.*
7. *Tegmina very short, quadrate or obliquely truncate in both sexes* . . . . . 24. Genus TEMNOPTERYX, Brunner von [Wattenwyl.
7'. *Tegmina of varying length, lanceolate in the male.*
8. *Ulnar vein simple.*
9. *Supra-anal lamina of male bilobed* . . . . . 23. Genus ANISOPYGIA, Saussure.
9'. *Supra-anal lamina not bilobed* . . . . . 21. Genus CERATINOPTERA, Brunner von [Wattenwyl.
8'. *Ulnar vein ramose.*
9. *Supra-anal lamina rounded* . . . . . 19. Genus ALLACTA, Saussure & Zehntner.
9'. *Supra-anal lamina produced.* . . . . . 20. Genus ANALLACTA, nov. gen.
6'. *Tegmina lobiform or absent.*
7. *Tegmina lobiform* . . . . . 25. Genus LOBOPTERA, Brunner von Watten-
7'. *Tegmina absent* . . . . . 27. Genus APTEROBLATTA, Shelford. [wyl.
4'. *No arolia between the tarsal claws.*
5. *Tegmina lobiform* . . . . . 29. Genus PARALOBOPTERA, Saussure.
5'. *Tegmina not lobiform.*
6. *Ulnar vein of wings simple* . . . . . 22. Genus PARACERATINOPTERA, Saussure.
6'. *Ulnar vein of wings branched* . . . . . 0. Genus PARATEMNOPTERYX, Saussure.
3'. *Genital styles of male bifurcate at apex* . . . . . 14. Genus ONYCHOSTYLUS, Bolivar.
2'. *Eyes joined on vertex of the head* . . . . . 13. Genus DESMOSIA, Bolivar.
1'. *Eyes rudimentary.* . . . . . 28. Genus ATTAPHILA, Wheeler.

1. GENUS PSEUDOMOPS, SERVILLE

Pseudomops. Serville, Ann. Sc. Nat. p. 41 (1831); Hist. Ins. Orth. p. 115 (1839).
Thyrsocera. Burmeister et auctores (in parte).

Characters. — Ocelli absent. Antennæ with basal half densely hirsute except in the male sex of some species. Pronotum with posterior border obtusely angled. Tegmina with the anterior ulnar vein simple, the branches of the posterior ulnar vein forming an angle with the main stem, longitudinal. Wings without a triangular apical field, veins stout, branches of the ulnar vein few. Supra-anal lamina triangular, emarginate. Openings of the odoriferous glands on the abdominal tergites in the male sex usually conspicuous. Cerci elongate, in some species spatulate. Sub-genital lamina of male with styles. Femora strongly armed beneath.

Geographical distribution of species. — Southern States of North America, Central America, South America.

Species with non-spatulate cerci :

1. *P. oblongata*, Linnæus, Syst. Nat. (ed. 10), Vol. 1, p. 425, n. 9 (1758) (Surinam).
2. *P. intercepta*, Burmeister, Handb. Ent. Vol. 2, p. 497, n. 10 (1838) (Central America, Honduras).
   Thyrsocera tolteca, Saussure, Rev. Zool. (2), Vol. 14, p. 168 (1862).
3. *P. inclusa*, Walker, Cat. Blatt. Brit. Mus. p. 212 (1868) (Brazil, Pernambuco).
   Thyrsocera amoena, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 97 (1873).
4. *P. laticornis*, Perty, Del. Anim. Art. p. 117, pl. 23, f. 4 (1834) (Brazil).
   Thyrsocera dubia, Saussure, Rev. Zool. (2), Vol. 14, p. 168 (1862).
   P. concinna, Walker, Cat. Blatt. Brit. Mus. p. 82 (1868).
5. *P. annulicornis*, Burmeister, Handb. Ent. Vol. 2, p. 500, n. 9 (1838) (Brazil).
   P. deceptura, Walker, Cat. Blatt. Brit. Mus. p. 82 (1868).
6. *P. aurantiaca*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 32, pl. 3, f. 6, 7 (1893) (Panama).
7. *P. grata*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 260 (1903) (Costa Rica).
8. *P. americana*, Saussure, Rev. Zool. (2), Vol. 21, p. 111 (1869) (Argentine).
9. *P. mimica*, Walker, Cat. Blatt. Brit. Mus. p. 80 (1868) (Brazil).
10. *P. cincta*, Burmeister, Handb. Ent. Vol. 2, p. 499, n. 3 (1838) (Central America, Texas).
    Thyrsocera mexicana, Saussure, Rev. Zool. (2), Vol. 14, p. 168 (1862).
    Thyrsocera sallei, Saussure, ibidem, p. 168 (1862).
11. *P. neglecta*, Shelford, Trans. Ent. Soc. Lond. p. 256 (1906) (Rio Grande do Sul, Brazil).
12. *P. affinis*, Burmeister, Handb. Ent. Vol. 2, p. 499, n. 4 (1838) (Surinam, Brazil).
    Thyrsocera hirticornis, Burmeister, ibidem, p. 499, n. 10 (1838).
13. *P. flavipes*, Burmeister, ibidem, p. 499, n. 5 (1838) (Brazil).
14. *P. discicollis*, Burmeister, ibidem, p. 1012 (1838) (Mexico).
15. *P. angusta*, Walker, Cat. Blatt. Brit. Mus. p. 81 (1868) (Santarem, Colombia). — **Plate I, Fig. 1.**
16. *P. burri*, Shelford, Trans. Ent. Soc. Lond. p. 257, pl. 14, f. 1 (1906) (Ecuador).
17. *P. magna*, Shelford, ibidem, p. 259 (1906) (Ecuador). — **Plate I, Fig. 2.**
18. *P. albostriata*, Shelford, ibidem, p. 259 (1906) (Ecuador).
19. *P. bicolor*, Shelford, ibidem, p. 260, pl. 16, f. 12, pl. 14, f. 7 (1906) (Ecuador).
20. *P. gueriniana*, Saussure, Rev. Zool. (2), Vol. 14, p. 168 (1862); Mém. Mexique, Blatt. p. 124 (1864). (Mexico).
21. *P. obscura*, Saussure, Mission Sc. Mexique, Orth. p. 52 (1870) (Bolivia).

Species with spatulate cerci :

22. *P. femoralis*, Walker, Cat. Blatt. Brit. Mus. p. 81 (1868) (Brazil).
    Thyrsocera crinicornis, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 126 (1865).
23. *P. brunneri*, Saussure, Rev. Zool. (2), Vol. 21, p. 111 (1869) (Surinam).
24. *P. crinicornis*, Burmeister, Handb. Ent. Vol. 2, p. 499, n. 2 (1838) (Brazil).
    P. affinis, Walker, Cat. Blatt. Brit. Mus. p. 79 (1868).
25. *P. luctuosa*, Saussure, Rev. Zool. (2), Vol. 20, p. 99 (1868) (Surinam).
26. *P. tristicula*, Stâl, Freg. Eugen. Resa, Ent. Vol. 5, p. 310 (1858) (Brazil).
27. *P. simulans*, Stâl, ibidem, p. 310 (1858) (Brazil).
28. *P. nigrita*, Saussure, Rev. Zool (2), Vol. 21, p. 111 (1869) (Brazil).
29. *P. puiggarii*, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 10, p. 354 (1881) (Brazil).
30. *P. melana*, Walker, Cat. Blatt. Brit. Mus. p. 80 (1868) (Brazil).

2. Genus PSEUDOTHYRSOCERA, Shelford

Pseudothyrsocera. Shelford, Trans. Ent. Soc. Lond. p. 250 (1906).

Characters. — Similar to *Pseudomops*, Serville, but with the anterior ulnar vein of the tegmina bifurcated instead of simple, the pronotum truncate posteriorly, and the antennæ generally incrassated and hirsute at the base in both sexes.

Geographical distribution of species. — Indo-Malayan Islands, Celebes and Philippines.

1. *P. scutigera*, Walker, Cat. Blatt. Brit. Mus. p. 212 (1868) (Borneo).
2. *P. pica*, Walker, ibidem, p. 213 (1868) (Singapore, Sumatra). — **Plate I, Fig. 3.**
3. *P. xanthophila*, Walker, ibidem, p. 230 (1868) (Celebes).
4. *P. montana*, Shelford, Trans. Ent. Soc. Lond. p. 251 (1906) (Borneo).
5. *P. ruficollis*, Shelford, ibidem, p. 251, pl. 14, f. 6 (1906) (Penang).
6. *P. lugubris*, Stål, Oefv. Vet.-Akad. Förh. Vol. 34 (10), p. 33 (1877) (Philippines).
7. *P. rufiventris*, Stål, ibidem, p. 33 (1877) (Philippines).
   P. semicincta, Stål, ibidem, p. 33 (♀) (1877).
8. *P. circumcincta*, Stål, ibidem, p. 33 (1877) (Philippines).
   P. circumclusa, Stål, ibidem, p. 34 (♀) (1877).
9. *P. signata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 119 (1865) (Philippines).

3. Genus PACHNEPTERYX, Brunner von Wattenwyl

Pachnepteryx. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 116 (1865).

Characters. — Allied to *Pseudothyrsocera*, Shelford. Antennæ hirsute at base in both sexes. Pronotum with posterior border truncate, exposing the scutellum. Tegmina acuminate, corneous, the venation indistinct or quite obscured. Wings without triangular apical field. Femora strongly armed beneath.

Geographical distribution of species. — Philippine Islands.

1. *P. pruinosa*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 117 (1865) (Philippines).
2. *P. ventralis*, Walker, Cat. Blatt. Brit. Mus. p. 85 (1868) (Philippines).
3. *P. pallidicollis*, Stål, Oefv. Vet.-Akad. Förh. Vol. 34 (10), p. 33 (1877) (Philippines).
4. *P. signaticollis*, Stål, ibidem, p. 33 (1877) (Philippines).

4. Genus ELLIPSIDION, Saussure

Ellipsidion. Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 146 (1863).
Apolyta. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 112 (1865).

Characters. — Antennæ long, basal two-thirds incrassated, hirsute. Pronotum transversely elliptical, anteriorly not covering the vertex of the head, posteriorly truncate, exposing the large scutellum. Tegmina semi-corneous with the branches of the posterior ulnar vein ramose, not angulate. Median vein of the wings with the apex furcate, no triangular apical field. Femora strongly armed beneath. Ootheca chitinous, carried by the female with the suture uppermost.

Geographical distribution of species. — Australia and New Guinea.

1. *E. variegatum*, Fabricius, Syst. Ent. p. 273, n. 13 (1775) (Australia).
   ? E. vestitum, Burmeister, Handb. Ent. Vol. 2, p. 408, n. 11 (1838).
2. *E. australe*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 146, pl. 1, f. 11 (1863) (Australia).
   E. pellucidum, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 114, n. 2, pl. 3, f. 10 (1865).
   E. placens, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 29 (1871) (larva).
3. *E. aurantium*, Saussure, Rev. Zool. (2), Vol. 16, p. 312 (1864) (Australia).
4. *E. reticulatum*, Saussure, ibidem, p. 312 (1864) (Australia).
5. *E. gracile*, Butler, Cist. Ent. Vol. 1, p. 294 (1874) (Rockhampton, Australia).
6. *E. femoratum*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 101 (1865) (Sydney, Australia).
7. *E. quadripunctatum*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 45 (1893) (Adelaïde, Australia).

8. *E. humerale*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 46 (1893) (Australia).
9. *E. decoratum*, Tepper, ibidem, p. 46 (1893) (Australia).
10. *E. bicolor*, Tepper, ibidem, Vol. 19, p. 152 (1895) (Cape York, Australia).
11. *E. testaceum*, Tepper, Horn Exped. Centr. Austr. Pt. 2, p. 358 (1896) (Central Australia).
12. *E. litura*, Tepper, ibidem, p. 359 (1896) (Central Australia).
13. *E. albovittatum*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 95 (1873) (Australia).
14. *E. histrionicum*, Rehn, Proc. U. S. Nat. Mus. Vol. 27, p. 544 (1904) (Australia).
15. *E. castaneum*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 28 (1907) (New Guinea). — **Plate I, Fig. 6.**

Doubtful species :

16. *E. marginiferum*, Walker, Cat. Blatt. Brit. Mus. p. 107 (1868) (Australia).
17. *E. depressum*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 28 (1871) (Australia).
18. *E. ramosum*, Walker, ibidem, p. 29 (1871) (Australia).

5. Genus ISCHNOPTERA, Burmeister

Ischnoptera. Burmeister, Handb. Ent. Vol. 2, p. 500 (1838).
Platamodes. Scudder, Boston Journ. Nat. Hist. Vol. 7, p. 417 (1862).

Characters. — Antennæ much longer than the body, not incrassated, nor hirsute. Pronotum typically trapezoidal, sides deflexed, anteriorly not quite covering vertex of head. Tegmina and wings reduced in the females of some species, in the males always longer than the body. Wings with the ulnar vein sending some branches towards the dividing vein and others towards the apex of the wing. Subgenital lamina of the male frequently asymmetrical and provided with one or with two styles. Cerci elongate. Legs long, slender; femora strongly spinose. Ootheca, where known, coriaceous in texture and carried by the female with the suture directed to one side.

Geographical distribution of species. — All the regions of the world, except the Palæarctic.

a. **Ethiopian species :**

1. *I. cinnamomea*, Gerstäcker. Mitth. Ver. Vorpomm. Vol. 14, p. 62 (1883) (Cameroons).
   I. basalis, Gerstäcker, ibidem, p. 63 (1883).
2. *I. punctifrons*, Gerstäcker, ibidem, p. 63 (1883) (Cameroons).
   I. aegrota, Gerstäcker, ibidem, p. 64 (1883).
3. *I. relucens*, Gerstäcker, ibidem, p. 65 (1883) (Ogowe).
4. *I. bocagii*, Bolivar, Jorn. Sc. Acad. Lisboa, Vol. 8, p. 107 (1881) (Angola).
5. *I. strigosa*, Schaum, Peters Reise Mossamb. Zool. Vol. 5, p. 108 (1862) (Mozambique).
6. *I. neutra*, Saussure, Abh. Senckenb. Ges. Frankfurt, Vol. 21, p. 571 (1899) (East Africa).
7. *I. incuriosa*, Saussure, ibidem, p. 571 (1899) (East Africa).
8. *I. bimaculata*, Gerstäcker, Arch. f. Naturg. Vol 35, p. 206 (1869) (East Africa). — **Plate I, Fig. 5.**
9. *I. picea*, Schulthess, Ann. Mus. Stor. Nat. Genova, Vol 39, p. 166 (1898) (Somaliland).
10. *I. natalensis*, Walker, Cat. Blatt. Brit. Mus. p. 117 (1868) (Natal). — **Plate I, Fig. 4.**
11. *I. jallae*, Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 22. n. 563, p. 2 (1907) (Upper Zambesi).
12. *I. longstaffi*, Shelford, Ann. Mag. Nat. Hist. (8), Vol. 1, p. 157, pl. 9, f. 8 (1908) (Zambesi).
13. *I. malagassa*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 18, pl. 6, f. 66 (1895) (Madagascar).
14. *I. sikorae*, Saussure, Soc. Ent. Zürich, Vol. 6, p. 25 (1891) (Madagascar).

b. **Oriental species :**

15. *I. ruficollis*, Fabricius, Ent. Syst. Vol. 2, p. 10 (1793) (India).
16. *I. continua*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 22 (1871) (Bombay).

17. *I. brevipes*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 22 (1871) (Bombay).
18. *I. arcta*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 132 (1865) (Ceylon).
19. *I. procera*, Brunner von Wattenwyl, ibidem (1865) (Ceylon).
20. *I. biligata*, Walker, Cat. Blatt. Brit. Mus. p. 123 (1868) (Ceylon).
21. *I. himalayica*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 129 (1865) (Himalayas).
22. *I. ectobioides*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 104 (1873) (S. China).
23. *I. multiramosa*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 23, pl. 1, f. 8 (1893) (Burma).
24. *I. fusca*, Brunner von Wattenwyl, ibidem, p. 24 (1893) (Burma).
25. *I. modesta*, Brunner von Wattenwyl, ibidem, p. 24 (1893) (Burma).
26. *I. indica*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 130 (1865) (Malacca).
27. *I. reversa*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 147 (1869) (Singapore).
28. *I. ridleyi*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 26 (1907) (Singapore).
29. *I. cavernicola*, Shelford, ibidem, p. 27 (1907) (Borneo).
30. *I. excavata*, Shelford, Trans. Ent. Soc. Lond. p. 265, pl. 16, f. 11 (1906) (Borneo).
31. *I. montis*, Shelford, ibidem, p. 266, pl. 16, f. 10 (1907) (Borneo).
32. *I. flavicollis*, Serville, Hist. Ins. Orth. p. 69 (1839) (Java).
33. *I. perpulchra*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 27 (1907) (Celebes).
34. *I. ramosa*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 254 (1869) (E. Indies).

c. Australian species :

35. *I. australis*, Saussure. Mém Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 155, pl. 1, f. 17 (1863) (Australia).
36. *I. fulva*, Saussure, ibidem, p. 156, pl. 1, f. 18 (1863) (Australia).
37. *I. australiae*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 95 (1865) (New South Wales).
38. *I. termitina*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 157, pl. 1, f. 19 (1863) (Australia).
39. *I. triramosa*, Saussure, ibidem, Vol. 20, p. 252, (1869) (Australia).
40. *I. centralis*, Walker, Cat. Blatt. Brit. Mus. p. 120 (1868) (South Australia).
41. *I. anastomosa*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 53 (1893) (South Australia).
42. *I. contraria*, Tepper, ibidem, p. 54 (1893) (South Australia).
43. *I. manicata*, Tepper, ibidem, p. 53 (1893) (South Australia).
44. *I. obscura*, Tepper, ibidem, p. 54 (1893) (Australia).
45. *I. parallela*, Tepper, ibidem, p. 53 (1893) (Australia).
46. *I. brunneonigra*, Tepper, ibidem, Vol. 19, p. 155 (1895) (Victoria).

d. Nearctic species :

47. *I. pensylvanica*, De Geer. Mém. Ins. Vol. 3, p. 537, pl. 44, f. 4 (1773) (United States).
    I. nortoniana, Saussure, Rev. Zool. (2), Vol. 14, p. 169 (1862).
    Ectobia flavocincta (1), Scudder, Journ. Boston Soc. Nat. Hist. Vol. 7, p. 419 (1862).
    Blatta borealis, Saussure, ibidem, p. 166 (1862).
48. *I. uhleriana*, Saussure, Rev. Zool. (2), Vol. 14, p. 169 (1862) (United States).
    Platamodes unicolor, Scudder, Journ. Boston Soc. Nat. Hist. Vol. 7, p. 417 (1862).
49. *I. deropeltiformis*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 87 (1865) (North America).
50. *I. hyalina*, Scudder, Trans. Amer. Ent. Soc. Vol. 2, p. 307 (1869) (Texas).
51. *I. major* (2), Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 54 (1893) (Tennessee, United States).
52. *I. inæqualis*, Saussure & Zehntner, ibidem, p. 36, pl. 6, f. 14-17 (1893) (Texas, Mexico).
53. *I. occidentalis*, Saussure, Rev. Zool. (2) Vol. 14, p. 170 (1862) (New Orleans, Mexico).
54. *I. couloniana*, Saussure, ibidem, p. 169 (1862) (Texas, Mexico).
55. *I. translucida*, Saussure, Mém. Hist. Nat. Mexique, Blatt. p. 85 (1864) (North America).
56. *I. divisa*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 40 (1893) (Georgia, North Mexico).

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(1) Erroneously included in the first part (*Ectobiinae*) of this work.
(2) This may be synonymous with *I. hyalina*, Scudder.

57. *I. bolliana*, Saussure & Zehntner, Biol. Centr. Amer. Orth. p. 40 (1893) (Texas, New Mexico).
58. *I. borealis*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 133 (1865) (Delaware).
59. *I. nigricollis*, Walker, Cat. Blatt. Brit. Mus. p. 118 (1868) (Georgia).
60. *I. johnsoni*, Rehn, Ent. News, Philad. Vol 14, p. 234 (1903) (Florida, Indiana).
    I. intricata, Blatchley, 27th Ann. Rep. Dept. Geol. and Nat. Resources of Indiana, p. 186 [1902] (1903).
61. *I. virginica*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 86 (1865) (Virginia).

e. **Neotropical Species :**

62. *I. brasiliensis*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 130 (1865) (Brazil).
    I. clara, Walker, Cat. Blatt. Brit. Mus. p. 114 (1868).
63. *I. rufa*, De Geer, Mém. Hist. Ins. Vol. 3, p. 538. pl. 44, f. 7 (1773) (Brazil).
    I. rufa, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 131, pl. 3, f. 13 (1865).
    I. consobrina, Saussure, Rev. Zool. (2), Vol. 14, p. 170 (1862).
64. *I. marginata*, Brunner von Wattenwyl, ibidem, p. 132 (1865) (Brazil).
65. *I. erythrina*, Walker, Cat. Blatt. Brit. Mus. p. 219 (1868) (Brazil).
66. *I. fumata*, Burmeister, Handb. Ent. Vol. 2, p. 500 (1838) (Brazil).
67. *I. morio*, Burmeister, ibidem (1838) (Colombia).
68. *I. melasa*, Walker, Cat. Blatt. Brit. Mus. p. 118 (1868) (Santarem).
69. *I. rubiginosa*, Walker, ibidem, p. 121 (1868) (Santarem).
70. *I. hebes*, Walker, ibidem, p. 122 (1868) (Santarem).
71. *I. hamata*, Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 13, n. 311, p. 4 (1898) (Ecuador).
72. *I. sancta*, Giglio-Tos, ibidem, p. 5 (1898) (Ecuador).
73. *I. josephina*, Giglio-Tos, ibidem, p. 4 (1898) (Ecuador).
74. *I. bilunata*, Saussure, Rev. Zool. (2), Vol. 21, p. 111 (1869) (Bolivia).
75. *I. vilis*, Saussure, ibidem, p. 112 (1869) (Corrientes).
76. *I. ocularis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 103 (1873) (Cayenne).
77. *I. nyctoboroides*, Rehn, Proc. Acad. Nat. Sc. Philad. p. 266 (1906) (British Guiana).
78. *I. ignobilis*, Saussure, Rev. Zool. (2), Vol. 16, p. 313 (1864) (Buenos Aires, Guatemala).
79. *I. castanea*, Saussure, ibidem, Vol. 21, p. 112 (1869) (Brazil, Mexico).
80. *I. parvula*, Saussure, ibidem, Vol. 21, p. 112 (1869) (Brazil, Nicaragua, Cuba).
81. *I. festae*, Griffini, Boll. Mus. Zool. Univ. Torino, Vol. 11, n. 236, p. 2 (1896) (Panama).
82. *I. bergrothi*, Griffini, ibidem, p. 3 (1896) (Panama).
83. *I. conformis*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 37, pl. 3, f. 25 (1893) (Nicaragua).
84. *I. inca*, Saussure & Zehntner, ibidem, p. 38, pl. 4, f. 23 (1893) (Guatemala). — **Plate I, Fig. 6a.**
85. *I. nana*, Saussure & Zehntner, ibidem, p. 39 (1893) (Nicaragua).
86. *I. annulicornis*, Saussure & Zehntner, ibidem, p. 40 (1893) (Guatemala).
87. *I. undulifera*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. p. 31 (1871) (Nicaragua).
88. *I. mexicana*, Saussure, Rev. Zool (2), Vol. 14. p. 170 (1862) (Mexico).
89. *I. nahua*, Saussure, ibidem, Vol. 20, p. 356 (1868) (Mexico).
90. *I. azteca*, Saussure, ibidem, Vol. 14, p. 170 (1862) (Mexico).
91. *I. tolteca*, Saussure, ibidem, Vol 20, p. 356 (1868) (Mexico).
92. *I. peruana*, Saussure, ibidem, Vol. 14, p. 169 (1862) (Peru).
93. *I. taczanowskii*, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 10, p. 467 (1881) (Peru).
94. *I. elongata*, Beauvois, Ins. Afr. Amér. p. 183, Orth. pl. 1*b*, f. 5 (1805) (Haiti).
95. *I. bicolor*, Beauvois, ibidem, pl. 1*b*, f. 6 (1805) (Haiti).
96. *I. jamaicana*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 264 (1903) (Jamaica).
97. *I. adusta*, Caudell, The Canad. Entom. p. 237 (1905) (Porto Rico).
98. *I. excisa*, Bolivar, Mém. Soc. Zool. Fr. Vol. 1, p. 124 (1888) (Cuba).

Doubtful species :

99. *I. gracilis*, Burmeister, Handb. Ent. Vol. 2, p. 500, n. 2 (1838) (Cape of Good Hope).
100. *I. cincta*, Fabricius, Mant. Ins. Vol. 1, p. 226, n. 17 (1787) (North? America).
101. *I. castanea*, Blanchard, in Gay, Hist. fis. Chile, Zool. Vol. 6, p. 18, pl. 1, f. 2 (1851) (Chili).
    ? I. brevipennis, Saussure, Rev. Zool. (2), Vol. 16, p. 313 (1864).

6. Genus PARATEMNOPTERYX, Saussure

Paratemnopteryx. Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 273 (1869).

Characters. — Allied to *Ischnoptera*, Burmeister, but differing in the absence of arolia between the tarsal claws. Males with fully developed tegmina and wings, females with reduced tegmina and rudimentary wings. Ulnar vein of wing sending at least one incomplete branch towards the dividing vein. Styles flattened and partially fused with the sub-genital lamina in the male sex.

Geographical distribution of species. — Australia.

1. *P. australis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 273, pl. 3, f. 22 (1869) (Adelaide, Melbourne, Western Australia).
   P. australis, Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 149 (1895).
2. *P. blattoides*, Tepper (♂ only), ibidem, p. 150 (1895) (Melbourne). — Plate 2, Fig. 10.
3. *P. ? zietzii*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 20 (1895) (South Australia).

7. Genus CHRASTOBLATTA, Saussure & Zehntner

Chrastoblatta. Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 20 (1895).

Characters. — Head flattened, vertex broad, not covered by the pronotum. Pronotum transversely elliptical, flattened, posteriorly truncate exposing the scutellum. Tegmina narrow, crossing strongly and in repose exposing the sides of the abdomen, discoidal sectors longitudinal. Wings with narrow anterior field and few costals, ulnar vein sending two or three branches to apex of wing, one to three incomplete branches to the dividing vein, no apical triangle. Femora sparsely spined beneath, their genicular spines prominent. Supra-anal lamina transverse. Cerci elongate.

Geographical distribution of species. — Madagascar.

1. *C. tricolor*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 21, pl. 2, f. 17 (1895) (Madagascar).
2. *C. dimidiata*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 160 (1863) (Madagascar).
   Proscratea marginata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 326 (1865).

8. Genus PIROBLATTA, Shelford

Piroblatta. Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 29 (1907).

Characters. — Allied to *Chrastoblatta*, Saussure & Zehntner, but head almost entirely covered by pronotum. Tegmina broad and not crossing strongly. Wings with a prominent triangular apical area; ulnar vein bifurcate and sending also two or three incomplete branches to the dividing vein. Supra-anal lamina in the male somewhat quadrately produced, in the female triangularly produced. Front femora unarmed beneath, mid- and hind-femora very sparsely armed.

Geographical distribution of species. — Madagascar.

1. *P. bouvieri*, Shelford, Trans. Ent. Soc. Lond. p. 236 (1906) (Madagascar).
2. *P. alluaudi*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 29 (1907) (Madagascar).

9. Genus CALOBLATTA, Saussure

Caloblatta. Saussure, Soc. Ent. Zürich, Vol. 8, p. 57 (1893); Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 33 (1893).

Characters. — Antennæ with basal half incrassated and hirsute. Vertex of head not covered by pronotum. Surface of pronotum and tegmina velvety. Pronotum discoidal, sides barely deflexed. Ulnar vein of wings sending branches to the apex of the wing and some incomplete branches to the dividing vein. Front femora armed on the anterior margin beneath, the other femora unarmed; posterior tarsi very long, equal in length to the tibiæ. Supra-anal lamina in the male transverse, in the female triangular. Cerci moderate, depressed.

Geographical distribution of species. — Central America.

1. *C. bicolor*, Saussure, Soc. Ent. Zürich, Vol. 8, p. 57 (1893); Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 33 (1893) (Costa Rica, Nicaragua).
2. *C. tricolor*, Saussure, ibidem, p. 57 (1893); Saussure & Zehntner, ibidem, p. 34, pl. 3, f. 11-13 (1893) (Guatemala, Nicaragua).

10. Genus PSEUDISCHNOPTERA, Saussure

Pseudischnoptera. Saussure, Rev. Zool. (2), Vol. 21, p. 112 (1869).

Characters. — Body depressed. Antennæ incrassated and hirsute throughout their entire length. Pronotum trapezoidal, anterior margin arcuate, not covering vertex of head, posterior margin truncate, exposing the scutellum. Tegmina and wings longer than the abdomen in the male, shorter than the abdomen in the female. Tegmina coriaceous and punctate, their external margins sinuate, discoidal sectors longitudinal. Wings coloured; ulnar vein giving off branches to apex of wing and to the dividing vein. Supra-anal lamina in the male triangular, sub-genital lamina elongate and with two styles. Cerci long, mid- and hind- femora unarmed on the anterior margin beneath, but with four to five spines on the posterior margin and with one median spine, near the trochanteral articulation.

Geographical distribution of species. — South America, West Indies.

1. *P. lineata*, Olivier, Enc. Méth. Ins. Vol. 4, p. 317 (1789) (Cayenne, Antilles).
   P. lineata, Saussure, Mission Sc. Mexique, Orth. p. 67 (1870).

11. Genus PHYLLODROMIA, Serville

Phyllodromia. Serville, Hist. Ins. Orth. p. 105 (1839).
Mareta. Bolivar, Ann. Soc. Ent. Fr. p. 369 (1895).

Characters. — Vertex of head not covered by pronotum, distance apart of eyes scarcely greater than their breadth. Scutellum not exposed. Tegmina and wings usually longer than the body in both sexes (1), discoidal sectors of tegmina usually oblique. Wings with the ulnar vein typically multiramose (2), all the rami directed towards the apex of the wing; triangular apical field sometimes present.

(1) *P. supellectilium*, Serville, is an exception.
(2) *P. germanica*, Linnæus, is an exception.

Supra-anal lamina very variable in both sexes, but typically triangularly produced in the male. Scent-gland openings usually conspicuous. Sub-genital lamina of the male with a pair of small styles. Femora strongly armed beneath. Arolia present between the tarsal claws. Oothecæ, where known, coriaceous, carried by the female with the suture directed to one side.

Geographical distribution of species. — Cosmopolitan.

a. **Cosmopolitan species :**

1. *P. germanica*, Linnæus, Syst. Nat. (ed. 12), Vol. 1 (2), p. 668 (1767) (Cosmopolitan).
   Blatta obliquata, Daldorff, Skriv. Nat. Selsk. Vol. 2 (2 , p. 164 (1793).
   Ischnoptera bivittata, Thomas, Proc. Davenport Acad. Sc. Vol. 1, p. 250, pl. 36, f. 1, 2 (1876).
2. *P. bivittata*, Serville, Hist. Ins. Orth. p. 108 (1839) (Cosmopolitan).
3. *P. supellectilium*, Serville, ibidem, p. 114 (1839) (Cosmopolitan). — **Plate 2, Fig. 2.**
   Blatta cubensis, Saussure, Rev. Zool. (2), Vol. 14, p. 165 (1862).
   Blatta capensis, Saussure, ibidem, Vol. 16, p. 210 (1864).
   Blatta incisa, Walker, Cat. Blatt. Brit. Mus. p. 109 (1868).
   Blatta extenuata, Walker, ibidem, p. 221 (1868).
   Ischnoptera quadriplaga, Walker, ibidem, p. 121 (1868).
   Blatta phalerata, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 151, pl. 1, f. 16 (1864).
   Blatta subfasciata, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 26 (1871).
   Blatta transversalis, Walker, ibidem, p. 25 (1871).
   Blatta figurata, Walker, ibidem, p. 24 (1871).
   Phyllodromia delta, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 5, p. 280 (1900).
4. *P. rufescens*, Beauvois, Ins. Afr. Amér. p. 183, Orth. pl. 1 *b*, f. 7 (1805) (Cosmopolitan).
   Blatta capitata, Saussure, Rev. Zool. (2), Vol. 14, p. 167 (1862).
   Epilampra blattoides, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vo 17, p. 145 (1863).
   Ischnoptera terminalis, Walker, Cat. Blat. Brit. Mus. p. 122 (1868).
   Ischnoptera deprivata, Walker, ibidem, p. 215 (1868).

b. **Ethiopian species :**

5. *P. parenthesis*, Gerstäcker, Mitth. Ver. Vorpomm. Vol. 14, p. 57 (1883) (Ogowe, West Africa).
6. *P. hemerobina*, Gerstäcker, ibidem, p. 57 (1883) (Ogowe, West Afrika).
7. *P. centralis*, Gerstäcker, ibidem, p. 58 (1883) (Cameroons).
8. *P. pustulosa*, Gerstäcker, ibidem, p. 59 (1883) (Cameroons).
9. *P. patricia*, Gerstäcker, ibidem, p. 60 (1883) (Cameroons).
10. *P amplicollis*, Gerstäcker, ibidem, p. 66 (1883) (Gaboon).
11. *P. obsoleta*, Gerstäcker, ibidem, p. 66 (1883) (Gold Coast).
12. *P. mirabilis*, Shelford, Deutsche Ent. Zeitschr. p. 116, pl. 2, f. 3 (1908) (Cameroons).
13. *P. conradti*, Shelford, ibidem, p. 117, pl 2, f. 4 (1908) (Cameroons).
14. *P. neutra*, Shelford, ibidem, p. 118, pl. 2, f. 6 (1908) (Cameroons).
15. *P. alluaudi*, Bolivar, Ann. Soc. Ent. Fr. p. 171 (1893) (West Africa).
16. *P. reducta*, Walker, Cat. Blatt. Brit. Mus. p. 220 (1868) (West Africa).
17. *P. beauvoisii*, Walker, ibidem, p. 101 (1868) (Sierra Leone).
18. *P. cassiphila*, Rochebrune, Bull. Soc. Philom. Paris, (7), Vol. 7, p. 175 (1883) (Senegambia).
19. *P. munzigeri*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 94 (1873) (Bogos, West Africa).
20. *P. albovariegata*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 31 (1907) (Fernando Po).
21. *P. trigonalis*, Saussure, Abh. Senckenb. Ges. Frankfurt, Vol. 21, p. 574 (1899) (East Africa).
22. *P. nigromarginata*, Shelford, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro etc., pt. 17, Orthoptera Blattodea, p. 19, pl. 3, f. 12 (1907) (German E. Africa, Kilimanjaro).
23. *P. sjöstedti*, Shelford, ibidem, p. 20 (1907) (German E. Africa).
24. *P. insignis*, Shelford, ibidem, p. 20, pl. 3, f. 8 (1907) (Kilimanjaro).
25. *P. testacea*, Shelford, ibidem, p. 21, pl. 2, f. 14 (1907) (German E. Africa).
26. *P. ruficeps*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 5, p. 280 (1900) (Nyasaland, N.E. Rhodesia).
27. *P. lobiventris*, Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 73 (1895) (Shoa, Gallaland).
28. *P. constricta*, Saussure, ibidem, p. 74 (1895) (Erythræa, Somaliland).

29. *P. corommensis*, Schulthess-Schindler, Ann. Mus. Stor. Nat. Genova, Vol. 39, p. 165 (1898)(Somaliland).
30. *P. scioana*, Adelung, Ann. Mus. Zool. St-Pétersb. Vol. 9, p. 421 (1905) (Abyssinia).
31. *P. desertorum*, Adelung, ibidem, p. 424 (1905) (Abyssinia).
32. *P. cordofana*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 97 (1865) (Khartoum).
33. *P. treitliana*, Werner, Sitz. Ber. Akad. Wiss. Wien. Vol. 114, Abt. 1, p. 377 (1906) (Egypt).
34. *P. arundinicola*, Werner, ibidem, p. 377 (1906) (Egypt).
35. *P. angustefasciata*, Werner, ibidem, p. 378 (1906) (Egypt).
36. *P. trivirgata*, Werner, ibidem, Vol. 116, Abt. 1, p. 172 (1907) (Egyptian Soudan).
37. *P. aequatorialis*, Werner, ibidem, p. 172 (1907) (Egyptian Soudan).
38. *P. pallidula*, Werner, ibidem, p. 173 (1907) (Egyptian Soudan).
39. *P. madecassa*, Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 72 (1895) (Somaliland, Madagascar).
40. *P. saussurei*, nom. nov. (Madagascar).
    P. incisa, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 37, pl. 1, f. 8 (1895).
41. *P. fissa*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 39, pl. 1, f. 11 (1895) (Madagascar).
42. *P. ferrea*, Saussure & Zehntner, ibidem, p. 36, pl. 1, f. 7 (1895) (Madagascar).
43. *P. lacrymula*, Saussure & Zehntner, ibidem, p. 31, pl. 1, f. 10 (1895) (Madagascar).
44. *P. opima*, Saussure & Zehntner, ibidem, p. 40, pl. 1, f. 13 (1895) (Madagascar).
45. *P. voeltzkowiana*, Saussure & Zehntner, ibidem, p. 15, pl. 4, f. 42 (1895) (Madagascar).
46. *P. zehntneri*, nom. nov. (Madagascar, Kilimanjaro).
    Theganopteryx (Pseudectobia) punctulata (1), Saussure & Zehntner, Hist. Nat. Madag. Orth. Vol. 1, p. 15 (1895).
47. *P. neglecta*, nom. nov. (Madagascar).
    Blatta humbertiana, Saussure, Abh. Senckenb. Ges. Frankfurt, Vol. 21, p. 574 (1899).
48. *P. liturifera*, Stål, Freg. Eugen. Resa, Ent. p. 308 (1858) (Mauritius).
49. *P. innotabilis*, Walker, Cat. Derm. Salt. Mus. Vol. 5, Suppl. Blatt. p. 21 (1871) (Seychelles).
    Mareta conspicienda, Bolivar, Ann. Soc. Ent. Fr. p. 371 (1895).
50. *P. bitaeniata*, Stål, Oefv. Vet. Akad. Förh. Vol. 15, p. 308 (1858) (South-Africa).
51. *P. macilenta*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 33, pl. 1, f. 12 (1895) (South Africa).
52. *P. macroptera*, Walker, Cat. Blatt. Brit. Mus. p. 104 (1868) (Natal).

c. **Oriental species :**

53. *P. reticulata*, Fabricius, Ent. Syst. Suppl. p. 186 (1798) (India).
54. *P. marginata*, Bolivar, Ann. Soc. Ent. Fr. p. 288 (1897) (S. India).
55. *P. humbertiana*, Saussure, Mém. Soc. Sc. Phys. Nat Genève, Vol. 17, p. 130 (1863) (India, China).
    Phyllodromia cognata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 92 (1865).
    Blatta latistriga, Walker, Cat. Blatt. Brit. Mus. p. 106 (1868).
    Blatta subreticulata, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 23 (1871).
56. *P. telephoroides*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 23 (1871) (Bombay).
    Blatta annulifera, Walker, ibidem, p. 24 (1871).
57. *P. fasciceps*, Walker, ibidem, p. 25 (1871) (Bombay).
58. *P. lycoides*, Walker, ibidem, p. 23 (1871) (Bombay).
59. *P. inexacta*, Walker, ibidem, p. 26 (1871) (Bombay).
60. *P. submarginata*, Walker, ibidem, p. 27 (1871) (Cahar).
61. *P. ramifera*, Walker, ibidem, p. 27 (1871) (Nepaul).
62. *P. luneli*, Saussure, Rev. Zool. (2), Vol. 20, p. 355 (1868) (Nilgiris)
63. *P. diluta*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 153 (1863) (Ceylon).
64. *P. ceylanica*, Saussure, Rev. Zool. (2), Vol. 20, p. 355 (1868) (Ceylon).
65. *P. mendica*, nom. nov. (Ceylon, India).
    Blatta humbertiana, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 155 (1863); Vol. 20, p. 246 (1869).
66. *P. mellea*, Krauss, Anz. Akad. Wiss. Wien, p. 54 (1902) (Arabia).

(1) Erroneously included in the first part (*Ectobinae*) of this work.

67. *P. curvinervis*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 32 (1895) (Burma, Java).
68. *P. aliena*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 15 (1893) (Upper Burma).
69. *P. birmanica*, Brunner von Wattenwyl, ibidem, p. 17, pl. 1, f. 4 (1893) (Burma).
70. *P. unicolor*, Brunner von Wattenwyl, ibidem, p. 18 (1893) (Mandalay, Burma).
71. *P. subtilis*, Brunner von Wattenwyl, ibidem, p. 18 (1893) (Pegu, Burma).
72. *P. brunneri*, nom. nov. (Upper Burma).
    P. punctulata, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 18 (1893).
73. *P. feae*, nom. nov. (Burma).
    P. marmorata, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 19 (1893).
74. *P. vicina*, Brunner von Wattenwyl, ibidem, p. 19 (1893) (Burma).
75. *P. immunda*, Brunner von Wattenwyl, ibidem, p. 20 (1893) (Pegu, Burma).
76. *P. fuliginosa*, Brunner von Wattenwyl, ibidem, p. 16, pl. 1, f. 2 (1893) (Burma).
77. *P. lugubris*, Brunner von Wattenwyl, ibidem, p. 16, pl. 1, f. 3 (1893) (Rangoon, Burma).
78. *P. majuscula*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 139 (1869) (Siam).
79. *P. polygrapha*, Walker, Cat. Blatt. Brit. Mus. p. 222 (1868) (Siam).
80. *P. sordida*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 104 (1868) (Cambodia).
81. *P. marmorata*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 140 (1869) (Mt Ophir, Malay Peninsula). — **Plate 2, Fig. 1.**
82. *P. vilis*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 103 (1865) (Malacca).
83. *P. lituricollis*, Walker, Cat. Blatt. Brit. Mus. p. 105 (1868) (Bhamo, Upper Burma; Amoy, China).
    Blatta colligata, Walker, ibidem, p. 221 (1868).
    P. bisignata, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 15, pl. 1, f. 1 (1893).
84. *P. isomorpha*, Walker, Cat. Blatt. Brit. Mus. p. 108 (1868) (Hong-Kong).
85. *P. sinensis*, Walker, ibidem, Suppl. p. 148 (1869) (Hong-Kong).
86. *P. pallidiola*, Shiraki, Ann. Zool. Japon, Vol. 6, p. 20, pl. 2, f. 1 (1906) (Japan).
87. *P. ferruginea*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 102 (1865) (East Indies).
88. *P. megaspila*, Walker, Cat. Blatt. Brit. Mus. p. 98 (1868) (Penang, Java).
    Blatta arborifera, Walker, ibidem, p. 100 (1868).
89. *P. picturata*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 30 (1907) (Singapore).
90. *P. contingens*, Walker, Cat. Blatt. Brit. Mus. p. 229 (1868) (Singapore, Borneo).
    Blatta humeralis, Walker, ibidem, Suppl. p. 140 (1869).
91. *P. virescens*, Walker, Cat. Blatt. Brit. Mus. p. 231 (1868) (Borneo).
92. *P. obtusifrons*, Walker, ibidem, p. 226 (1868) (Borneo).
93. *P. elegans*, Walker, ibidem, p. 226 (1868) (Borneo).
94. *P. laterifera*, Walker, ibidem, p. 231 (1868) (Borneo).
95. *P. hamifera*, Walker, ibidem, p. 224 (1868) (Borneo).
96. *P. funebris*, Walker, ibidem, p. 225 (1868) (Borneo).
97. *P. notulata*, Stål, Freg. Eugèn. Resa, Ent. p. 308 (1858) (Borneo, Java, Tahiti).
    P. hieroglyphica, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 105 (1865).
98. *P. irregulariter-vittata*, Brunner von Wattenwyl, Abh. Senckenb. Ges. Frankfurt, Vol. 24, p. 202, pl. 16, f. 1 (1898) (Borneo, Java).
99. *P. rectangulariter-vittata*, Brunner von Wattenwyl, ibidem, p. 203, pl. 16, f. 3 (1898) (Borneo).
100. *P. triangulariter-vittata*, Brunner von Wattenwyl, ibidem, p. 203, pl. 16, f. 4 (1898) (Borneo).
101. *P. longealata*, Brunner von Wattenwyl, ibidem, p. 205, pl. 16, f. 9 (1898) (Borneo).
102. *P. nitens*, Brunner von Wattenwyl, ibidem, p. 204, pl. 16, f. 6 (1898) (Borneo).
103. *P. castanea*, Brunner von Wattenwyl, ibidem, p 204, pl. 16, f. 7 (1898) (Borneo).
104. *P. terminalis*, Brunner von Wattenwyl, ibidem, p. 206, pl. 16, f. 11 (1898) (Borneo).
105. *P. puncticollis*, Brunner von Wattenwyl, ibidem, p. 206, pl. 16, f. 12 (1898) (Borneo).
106. *P. nimbata*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 31 (1907) (Borneo).
107. *P. nebulosa*, Shelford, ibidem, p. 32 (1907) (Borneo).
108. *P. hewitti*, Shelford, ibidem, p. 33 (1907) (Borneo).
109. *P. picteti*, Fritze, Rev. Suisse Zool. Vol. 7, p. 337 (1899) (Java).
110. *P. subgenitalis*, Fritze, ibidem, p. 336 (1899) (Java, Sumatra).
111. *P. nodosa*, Fritze, ibidem, p. 335 (1899) (Java).

112. *P. adversa*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 33, pl. 1, f. 9 (1895) (Java).
113. *P. variegata*, Brunner von Wattenwyl, Abh. Senckenb. Ges. Frankfurt, Vol. 24, p. 205, pl. 16, f. 10 (1898) (Java).
114. *P. latius-vittata*, Brunner von Wattenwyl, ibidem, p. 202, pl. 16, f. 2 (1898) (Java).
115. *P. molesta*, Brunner von Wattenwyl, ibidem, p. 203, pl. 16, f. 5 (1898) (Java).
116. *P. secura*, Krauss, Denkschr. Med. Nat. Ges. Jena, Vol. 8, p. 749 (1903) (Java).
117. *P. anceps*, Krauss, ibidem, p. 749 (1903) (Java).
118. *P. picticollis*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 140 (1869) (Celebes).
119. *P. ignobilis*, Walker, Cat Blatt. Brit. Mus. p. 224 (1868) (Sula Islands).
120. *P. sequens*, Walker, ibidem, p. 229 (1868) (Celebes).
121. *P. nigrolineata*, Stâl, Oefv. Vet.-Akad. Förh. Vol. 34, p. 34 (1877) (Philippines).

d. **Australian species :**

122. *P. affinis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 248 (1869) (Banda).
123. *P. amplectens*, Walker, Cat. Blatt. Brit. Mus. p. 223 (1868) (Morty).
124. *P. guttifera*, Walker, ibidem, p. 230 (1868) (Aru Islands).
125. *P. suffusa*, Walker, ibidem, p. 223 (1868) (New Guinea).
126. *P. contigua*, Walker, ibidem, p. 228 (1868) (Celebes, New Guinea).
Blatta propinqua, Walker, ibidem, p. 228 (1868).
127. *P. papua*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 25, foot-note (1895) (Rockhampton, Australia).
128. *P. concisa*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 29 (1871) (Australia).
129. *P. liturata*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 150 (1895) (Victoria).
130. *P. magna*, Tepper, ibidem, p. 19 (1895) (South Australia).
131. *P. conjuncta*, Walker, Cat. Blatt. Brit. Mus. p. 109 (1868) (New Zealand).
132. *P. obtusata*, Brunner von Wattenwyl, Proc. Zool. Soc. Lond. p. 892 (1895) (Hawaiian Islands).
133. *P. hospes*, Perkins, Fauna Hawaii. Orth. p. 5 (1899) (Hawaiian Islands).

e. **Neotropical species :**

134. *P. adspersicollis*, Stâl, Freg. Eugen. Resa, Ent. p. 308 (1858) (Brazil, West Indies, Honduras).
Blatta latimarco, Walker, Cat. Blatt. Brit. Mus. p. 97 (1868).
135. *P. pellucida*, Burmeister, Handb. Ent. Vol. 2, p. 498 (1838) (Brazil).
136. *P. conspersa*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 106 (1865) (Brazil).
137. *P. fasciata*, Brunner von Wattenwyl, ibidem, p. 107 (1865) (Brazil).
138. *P. minor*, Brunner von Wattenwyl, ibidem, p 94 (1865) (Brazil).
139. *P. annulicornis*, Walker, Cat. Blatt. Brit. Mus. p. 219 (1868) (Brazil).
140. *P. parana*, Walker, ibidem, p. 100 (1868) (Para, Brazil).
141. *P. santarema*, Walker, ibidem, p. 107 (1868) (Santarem, Brazil).
142. *P. flexivitta*, Walker, ibidem, p. 216 (1868) (Santarem, Brazil).
143. *P. varicornis*, Walker, ibidem, p. 216 (1868) (Santarem, Brazil).
144. *P. cercalis*, Walker, ibidem, p. 214 (1868) (? Brazil).
145. *P. partita*, Walker, ibidem, p. 104 (1868) (? Brazil).
146. *P. fusca*, Saussure, Rev. Zool. (2), Vol. 21, p. 110 (1869) (Corrientes, Argentine).
147. *P borellii*, Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 9, n. 184, p. 2 (1894) (Paraguay).
148. *P. titania*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 267 (1903) (British Guiana).
149. *P. inexpectata*, Rehn, Proc. Acad. Nat. Sc. Philad. p. 268 (1906) (British Guiana).
150. *P. albida*, Saussure, Rev. Zool. (2), Vol. 21, p. 110 (1869) (New Granada).
151. *P. festae*, Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 13, n. 311, p. 2 (1898) (Ecuador).
152. *P. nigrita*, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 10, p. 477 (1881) (Ecuador).
153. *P. pallipes*, Scudder, Proc. Boston Soc. Nat. Hist. Vol. 12, p. 342 (1869) (Napo, Peru).
154. *P. intermedia*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 18 (1893) (Peru).
155. *P. reticularis*, Blanchard, in Gay, Hist. fis. Chile, Zool. Vol. 6, p. 15 (1852) (Chili).

156. *P. strigata*, Blanchard, in Gay, Hist. fis. Chile, Zool. Vol. 6, p. 17, pl. 1, f. 4 (1852) (Chili).
157. *P. pavida*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 268 (1903) (Costa Rica).
158. *P. spectativa*, Rehn, ibidem, p. 268 (1903) (Costa Rica).
159. *P. fraterna*, Saussure & Zehntner, Biol Centr. Amer. Orth. Vol. 1, p. 44 (1893) (Chontales, Nicaragua).
160. *P. subpectinata*, Saussure & Zehntner, ibidem, p. 17, pl. 4, f. 18 (1893) (Guatemala).
161. *P. zapoteca*, Saussure, Rev. Zool. (2), Vol. 14, p. 166 (1862) (Guatemala, Mexico).
162. *P. brunneriana*, Saussure, ibidem, Vol. 20, p. 98 (1868) (Mexico).
163. *P. nahua*, Saussure, ibidem, p. 355 (1868) (Mexico).
164. *P. totonaca*, Saussure, ibidem, Vol. 14, p. 165 (1862) (Mexico).
165. *P. dilatata*, Saussure, ibidem, Vol. 20, p 98 (1868) (Mexico).
166. *P. orizabae*, Saussure, ibidem, p. 355 (1868) (Mexico).
167. *P. acolhua*, Saussure, ibidem, p. 99 (1868) (Mexico).
168. *P. mexicana*, Saussure, ibidem, Vol. 16, p. 311 (1864) (Mexico).
169. *P. vitrea*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 109, pl. 2, f. 8 (1865) (Mexico, ? Fiji).
170. *P. azteca*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 43 (1893) (Mexico).
171. *P. alaris*, Saussure & Zehntner, ibidem, p. 43 (1893) (Mexico).
172. *P. maya*, Saussure & Zehntner, ibidem, p. 45 (1893) (Mexico).
173. *P. chichimeca*, Saussure & Zehntner, ibidem, p. 46, pl. 4, f. 22 (1893) (Mexico).
174. *P. punctulata*, Beauvois, Ins. Afr. Amér. p. 184, Orth. pl. 1 *b*, f. 8 (1805) (Mexico, Haiti, Cuba).
Blatta delicatula, Guérin, in Ramon de la Sagra, Hist. Cuba, Ins. p. 346 (1847).
175. *P. vacillans*, Walker, Cat. Blatt. Brit. Mus. p. 114 (1868) (Haiti).
176. *P. incisa*, Walker, ibidem, p. 109 (1868) (Haiti).
177. *P. antiguensis*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 17 (1893) (Antigua, Cuba).
178. *P. detersa*, Walker, Cat. Blatt. Brit. Mus. p. 215 (1868) (Jamaica).
179. *P. reticulosa*, Walker, ibidem, p. 103 (1868) (Jamaica, Saint Vincent).
P. semivitrea, Brunner von Wattenwyl, Proc. Zool. Soc. Lond. p. 203, pl. 15, f. 2 (1892).
180. *P. insularis*, Walker, Cat. Blatt. Brit. Mus. p. 101 (1868) (Jamaica).
181. *P. notata*, Brunner von Wattenwyl, Proc. Zool. Soc. Lond. p. 602, pl. 52, f. 1 (1893) (Grenada).
182. *P. infuscata*, Bruner, Journ. New York Ent. Soc. Vol. 14, p. 139 (1906) (Trinidad).
183. *P. binotata*, Bruner, ibidem, p. 140 (1906) (Trinidad).

Doubtful species :

184. *Blatta asiatica*, Pallas, Reise, Vol. 2, p. 727 (1773) (Siberia).
185. *Blatta bicincta*, Walker, in Melliss, St. Helena, p. 166 (1875) (St Helena).

12. Genus DURYODANA, Kirby

Duryodana. Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 274 (1903).

Characters. — Differs only from *Phyllodromia*, Serville, in the very large size of the maxillary palpi.

Geographical distribution of species. — Borneo.

1. *D. palpalis*, Walker, Cat. Blatt. Brit. Mus. p. 225 (1868) (Borneo). — **Plate I, Fig. 10, 11.**
Phyllodromia palpata, Brunner von Wattenwyl, Abh. Senckenb. Ges. Frankfurt, Vol. 24, p. 207, pl. 16, f. 13 (1898).

13. Genus DESMOSIA, Bolivar

Desmosia. Bolivar, Ann. Soc. Ent. Fr. p. 369 (1895).

Characters. — Front of head rather convex, separated from the vertex by the eyes, which are adjoined, a suture only dividing them. Palpi slender, second joint twice as long as third. First joint

of antennæ very long. Pronotum transversely elliptical, anteriorly truncate not covering vertex of head, posteriorly slightly arcuate. Tegmina and wings as in *Phyllodromia*. Seventh abdominal tergite of male with the posterior margin sinuate. Supra-anal lamina of male transverse, its posterior margin obtusely angulate and excised in the middle. Sub-genital lamina of male small, with two styles. Cerci long, the apical half subulate.

Geographical distribution of species. — Seychelle Islands.

1. *D. alluaudi*, Bolivar, Ann. Soc. Ent. Fr. p. 371 (1895) (Seychelle Islands).

14. Genus ONYCHOSTYLUS, Bolivar

Onychostylus. Bolivar, Ann. Soc. Ent. Fr. p. 289 (1897).

Characters. — Allied to *Phyllodromia*, Serville, but with the last joint of the maxillary palpi much shorter than the penultimate joint. Pronotum transverse. Supra-anal lamina in the male transverse, in the female with a median lobe, narrowly excised in the middle. Sub-genital lamina in the male deeply excised, styles bifid at apex and spined.

Geographical distribution of species. — India.

1. *O. unguiculatus*, Bolivar, Ann. Soc. Ent. Fr. p. 290, pl. 10, f. 4, 4*a*, 4*b* (1897) (Trichinopoly, India).

15. Genus LUPPARIA, Walker

Lupparia. Walker, Cat. Blatt. Brit. Mus. p. 65 (1868)

Pseudectobia. Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 234 (1869); Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 36 (1907).

Characters. — Allied to *Phyllodromia*, Serville but wings with a prominent triangular apical area, ulnar vein ramose. Femora strongly armed. Supra-anal lamina produced triangularly.

Geographical distribution of species. — Mascarene Islands, India Malay Archipelago.

1. *L. insularis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 237 (1869) (Mauritius).
2. *L. pallidula*, Bolivar, Ann. Soc. Ent. Fr. p. 287, pl. 10, f. 3 (1897) (South India).
3. *L. adimonialis*, Walker, Cat. Blatt. Brit. Mus. p. 66 (1868) (Philippines). — **Plate I, Fig. 12.**

16. Genus LIOSILPHA, Stål

Liosilpha. Stål, Bih. Svensk. Akad. Vol. 2 (13), p. 10 (1874).

Characters. — Broad, convex insects. Tegmina short, scarcely exceeding apex of abdomen, their venation often obsolete in the anal and discoidal fields, marginal field broad. Wings with a minute apical triangle or none, ulnar vein multiramose. Femora strongly armed. Sub-genital lamina of male with large, asymmetrical and strongly chitinised styles.

Geographical distribution of species. — Africa, Japan, Brazil.

1. *L. curta*, Walker, Cat. Blatt. Brit. Mus. p. 220 (1868) (Congo).
2. *L. anomala*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 248 (1869) (Gaboon).
3. *L. alluaudi*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 35 (1907) (Madagascar).
4. *L. japonica*, Shelford, ibidem, p. 33 (1907) (Japan).
5. *L. pumicata*, Stål, Freg. Eugen. Resa, Ent. p. 309 (1858) (Brazil).

17. Genus PSEUDOPHYLLODROMIA, Brunner von Wattenwyl

Pseudophyllodromia. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 111 (1865).

Characters. — Head very broad, not covered by the pronotum, eyes widely separate. Pronotum transversely elliptical. Tegmina somewhat attenuated towards apex, anterior ulnar vein ramose, posterior ulnar vein simple, angled. Wings with ulnar vein ramose. Supra-anal lamina triangular, produced. Front femora with a few long spines on anterior margin beneath, succeeded distally by close-set piliform setæ.

Geographical distribution of species. — Borneo, Singapore, Philippines, Central and South America.

The Oriental species differ from the Neotropical species in the following characters :

Branches of ulnar vein of tegmina oblique numerous, branches of ulnar vein of wings numerous . . . . . Pseudophyllodromia.

Branches of ulnar vein of tegmina longitudinal, parallel, three in number, branches of ulnar vein of wings three to four in number . . . . . Euphyllodromia, nov.subg.

a. PSEUDOPHYLLODROMIA

1. *P. ornata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 112 (1865) (Philippines).
2. *P. laticeps*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 142 (1869) (Singapore, Borneo). — **Plate I, Fig. 8.**
   Phyllodromia laticaput, Brunner von Wattenwyl, Abh. Senckenb. Ges. Frankf. Vol. 24, p. 205, pl. 16, f. 8 (1898).
3. *P. pulcherrima*, Shelford, Trans. Ent. Soc. Lond. p. 266, pl. 14, f. 3 (1906) (Sarawak, Borneo).
4. *P. bipunctata*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 141 (1869) (Celebes).

b. EUPHYLLODROMIA

5. *P. alternans*, Serville, Hist. Ins. Orth. p. 114 (1839) (Cayenne).
6. *P. pavonacea*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 263 (1903) (British Guiana).
7. *P. prona*, Rehn, Proc. Acad. Nat. Sc. Philad. p. 264 (1906) (British Guiana).
8. *P. fasciatella*, Saussure, Rev. Zool. (2), Vol. 20, p. 99 (1868) (Surinam).
9. *P. hystrix*, Saussure, ibidem, Vol. 21, p. 110 (1869) (Venezuela, Colombia). — **Plate I, Fig. 9.**
   P. histrio, Saussure, Mission Sc. Mexique, Vol. 6, p. 46 (1870).
10. *P. heydeniana*, Saussure, Rev. Zool. (2), Vol. 16, p. 313 (1864) (Brazil).
11. *P. obscura*, Saussure, Mém. Soc Sc. Phys. Nat. Genève, Vol. 23, p. 98 (1873) (Brazil).
12. *P. lineolata*, Dalman, Anal. Ent. p. 87 (1823) (Brazil).
    ? *P. lineolata*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 98 (1873).
13. *P. variegata*, Walker, Cat. Blatt. Brit. Mus. p. 112 (1868) (Brazil).
14. *P. perloides*, Walker, ibidem, p. 217 (1868) (Brazil).
15. *P. peruana*, Saussure, Rev. Zool. (2), Vol. 16, p. 311 (1864) (Peru).
16. *P. angustata*, Latreille, in Humboldt & Bonpland., Observ. Zool. Vol. 1, p. 146, pl. 15, f. 9 (1807) (Vera Cruz, Mexico).
    Blatta venosa, Saussure, Rev. Zool. (2), Vol. 16, p. 310 (1864). — **Plate I, Fig. 7.**

Doubtful species :

17. *P. liturifera*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 21 (1871) (West Coast of North America).

18. Genus MACROPHYLLODROMIA, Saussure & Zehntner

Macrophyllodromia. Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 46 (1893).

Characters. — Allied to *Pseudophyllodromia,* Brunner von Wattenwyl, but tegmina broader, their anterior field very broad, with numerous costal veins, discoidal sectors oblique. Wings with anterior field very broad, ulnar vein multiramose. Front femora armed beneath on the front margin with a complete row of long spines.

Geographical distribution of species. — Mexico.

1. *M. maximiliani,* Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 100, pl. 10, f. 35 (1873) (Mexico).

19. Genus ALLACTA, Saussure & Zehntner

Allacta. Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 45 (1895).
Abrodiaeta. Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 20 (1893).

Characters. — Small species, very like *Phyllodromia* in appearance. Tegmina and wings usually shorter than the body. Median vein of wings absent or given off as a branch of the radial, sometimes branched, costal veins few and irregular, ulnar vein ramose. Supra-anal lamina rounded. Femora weakly spined.

Geographical distribution of species. — India, Ceylon, Burma, Borneo, Australia.

1. *A. crassivenosa,* Bolivar, Ann. Soc. Ent. Fr. p. 290 (1897) (India).
2. *A. latipennis,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 109 (1865) (Ceylon, New Zealand?, Australia?).
3. *A. modesta,* Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 21, pl. 1, f. 5 (1893) (Burma)
4. *A. parva,* Shelford, Trans. Ent. Soc. Lond. p. 268 (1906) (Borneo).
5. *A. spuria,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 96 (1865) (Fiji, Australia). — **Plate 2, Fig. 7.**
   Blatta mundicola, Walker, Cat. Blatt. Brit. Mus. p. 101 (1868).
   Blatta inquinata, Walker, ibidem, p. 103 (1868).
   Blatta latirupta, Walker, ibidem, Suppl. p. 143 (1869).
   Blatta bitaeniata, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 243 (1869).
   Apolyta marginata, Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 152 (1895).
6. *A. similis,* Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 245 (1869) (Australia).
   Blatta patula, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 143 (1869).
   Apolyta pallida, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 46 (1893).
7. *A. pallescens,* Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 152 (1895) (Victoria).

20. Genus ANALLACTA, nov. gen.

Allacta (part). Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 45 (1895).

Characters. — Large coriaceous insects, superficially resembling species of Periplanetine genera, such as *Methana* and *Periplaneta.* Marginal field of tegmina very broad. Wings sometimes reduced, median vein sometimes ramose, sometimes absent, costals more numerous than in the preceding genus, rather irregular, ulnar vein ramose. Supra-anal lamina triangular, produced. Femora strongly armed.

Geographical distribution of species. — Madagascar.

1. *A. lobata,* Saussure, Soc. Ent. Zurich, Vol. 6, p. 25 (1891) (Madagascar).
   A. lobata, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 46, pl. 1, f. 4 (1895).
2. *A. undata,* Saussure & Zehntner, ibidem, p. 47, pl. 1, f. 5 (1895) (Madagascar).
3. *A. brachyptera,* Saussure & Zehntner, ibidem, p. 49, pl. 1, f. 6 (1895) (Madagascar).
4. *A. abbreviata,* Saussure & Zehntner, ibidem, p. 50 (1895) (Madagascar).
5. **A. methanoides, nov. sp.**(1) (Madagascar). — **Plate 2, Fig. 8.**

21. Genus CERATINOPTERA, Brunner von Wattenwyl

Ceratinoptera. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 75 (1865).
Balta. Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 40 (1893).

Characters. — Tegmina very variable in size, sometimes reaching the apex of the abdomen, sometimes much reduced, always lanceolate in the male, sometimes quadrate in the female. Wings well-developed, reduced or rudimentary, ulnar vein simple, occasionally bifurcate, never ramose. Supra-anal lamina of male usually triangular. Femora strongly armed.

Geographical distribution of species. — All the regions of the world except the Palearctic.

1. *C. dimidiata,* Gerstäcker, Arch. f. Naturg. Vol. 35, p. 205 (1869) (East Africa).
2. *C. abyssinica,* Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 93 (1873) (Abyssinia).
3. *C. variegata,* Schulthess-Schindler, Bull. Soc. Vaudoise Sc. Nat. Vol. 35, p. 191, pl. 8, f. 1 (1899) (East Africa, Delagoa Bay, Transvaal).
   C. hottentota, Saussure, Abh. Senckenb. Ges. Frankf. Vol. 21, p. 575 (1899).
   Aphlebia transvaaliensis, Kirby, Ann. Mag. Nat. Hist. Lond. (7), Vol. 5, p. 278 (1900).
4. *C. portalensis,* Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 22, n. 556, p. 1 (1907) (Uganda).
5. *C. bimaculata,* Shelford, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro etc., pt. 17. Orthoptera Blattodea, p. 23 (1907) (German E. Africa).
6. *C. usambarensis,* nom. nov. (German E. Africa).
   C. castanea, Shelford, ibidem, p. 23 (1907).
7. *C. sjöstedti,* Shelford, ibidem, p. 23, pl. 3, f. 16-17 (1907) (German E. Africa).
8. *C. variabilis,* Shelford, ibidem, p. 24 (1907) (Kilimandjaro).
9. *C. perpulchra,* Shelford, ibidem, p. 25, pl. 2, f. 2, pl. 3, f. 13 (1907) (Kilimandjaro).
10. *C. ovata,* Shelford, ibidem, p. 25 (1907) (German E. Africa).
11. *C. bolivari,* Adelung, Ann. Mus. Zool. St. Petersb. Vol. 9, p. 431 (1905) (Gallaland).
12. *C. schulthessi,* Kirby, Syn. Cat Orth. Vol. 1, p. 103 (1904) (South, West and East Africa,? Ceylon).
    Temnopteryx ferruginea, Schulthess-Schindler, Ann. Mus. Stor. Nat. Genova, Vol. 39, p. 165 (1898).
13. *C. inscripta,* Walker, Cat. Blatt. Brit. Mus. p. 145 (1868) (Natal). — **Plate 2, Fig. 6.**
14. *C. madecassa,* Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 238, pl. 3, f. 19 (1869) (Madagascar).
15. *C. abbreviata,* Saussure, ibidem, Vol. 17, p. 149, pl. 1, f. 13 (1864) (Réunion Island).
16. *C. martini,* Bolivar, Ann. Soc. Ent. Fr. p. 292, pl. 10, f. 6 (1897) (Trichinopoly, India).
17. *C. fulva,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 85 (1865) (Java).
18. *C. sundaica,* Fritze, Rev. Suisse Zool. Vol. 7, p. 338 (1900) (Java).
19. *C. couloniana,* Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 150, pl. 1, f. 14 (1864) (Australia).
    Paratemnopteryx blattoides, Tepper (♀), Trans. Roy. Soc. S. Austral. Vol. 19, p. 149 (1895).

(1) *A. methanoides,* nov. sp. — ♂. Allied to *A. undata,* Saussure & Zehntner, but disc of pronotum unmarked. Lateral margins of pronotum and mediastinal area of tegmina testaceous. Median vein of wing a branch of the radial vein. Supra-anal lamina triangular, produced, apex not emarginate, sub-genital lamina transverse, widely emarginate. — Total length 20 mm.; length of tegmina 15.5 mm.; pronotum 5.4 mm. × 8 mm. — Antongil Bay, N. E. Madagascar.

20. *C. platysoma,* Walker, Cat. Blatt. Brit. Mus. p. 111 (1868) (Western Australia).
21. *C. epilamproides,* Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 40 (1893) (Kangaroo Is., Australia).
22. *C. ferruginea,* Tepper, ibidem, Vol. 19, p. 148 (1895) (Victoria)
23. *C. texensis.* Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 52, pl. 3, f. 31 (1893) (Texas, New Mexico).
24. *C. lutea,* Saussure & Zehntner, ibidem, p. 48 (1893) (Georgia, U. S. America).
25. *C. tarasca,* Saussure, Rev. Zool. (2), Vol. 14, p. 164 (1862) (Mexico).
26. *C. otomia,* Saussure, ibidem, Vol. 20, p. 98 (1868) (Mexico).
27. *C. limbata,* Saussure, ibidem, p. 98 (1868) (Mexico).
28. *C. sumichrasti,* Saussure, ibidem, p. 97 (1868) (Mexico).
29. *C. olmeca,* Saussure, ibidem, p. 354 (1868) (Mexico).
30. *C. kaupiana,* Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 92 (1873) (Mexico).
31. *C. nitida,* Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 53, pl. 4, f. 31, 32 (1893) (Mexico).
32. *C. guatemalae,* Saussure & Zehntner, ibidem, p. 53, pl. 4, f. 27, 28 (1893) (Guatemala).
33. *C. fissa,* Saussure & Zehntner, ibidem, p. 54, pl. 4, f. 29, 30 (1893) (Guatemala).
34. *C. lobipennis,* Saussure, Mission Sc. Mexique, Orth. p. 26 (1870) (Brazil).
35. *C. facies,* Walker, Cat. Blatt. Brit. Mus. p 102 (1868) (? Brazil).
36. *C. picta,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 76, pl. 1, f. 4 (1865) (Brazil).
37. *C. castanea,* Brunner von Wattenwyl, ibidem, p. 77 (1865) (Brazil).
38. *C. ardua,* Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 12, n. 302, p. 3 (1897) (Argentine).
39. *C. continua,* Giglio-Tos, ibidem, p. 4 (1897) (Argentine).
40. *C. peruviana,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 78 (1865) (Peru).
41. *C. dimorpha,* Bolivar, An. Soc. Esp. Hist. Nat. Vol. 10, p. 464, pl. 8, f. 4 (1881) (Peru).
42. *C. snodgrassi,* McNeill, Proc. Acad. Nat. Sc. Wash. Vol. 3, p. 493 (1901) (Galapagos Islands).
43. *C. incommoda,* Kirby, Journ. Linn. Soc. Lond. Vol. 20, p. 533 (1894) (Fernando Noronha).
44. *C. diaphana,* Fabricius, Ent. Syst. Vol. 2, p. 11 (1792) (West Indies).
45. *C. poeyi,* Saussure, Rev. Zool. (2), Vol. 14, p. 164 (1862) (Cuba).
46. *C. porcellana,* Saussure, ibidem, p. 164 (1862) (Cuba).

Doubtful species :

47. *C. pygmaea,* Beauvois, Ins. Afr. Amér. p. 184, Orth. pl. 1*b*, f. 9 (1805) (Haiti).
48. *C. discalis,* Walker, Cat. Blatt. Brit. Mus. p. 111 (1868) (West Australia).
49. *C. latipes,* Walker, ibidem, p. 165 (1868) (St. Helena, Sierra Leone).

22. Genus PARACERATINOPTERA, Saussure

Paraceratinoptera, Saussure, Rev. Zool. (2), Vol. 20, p. 357 (1868); Mission Sc. Mexique, Orth. p. 87 (1870).

Characters. — Differs from *Ceratinoptera,* Brunner von Wattenwyl, in the absence of arolia between the tarsal claws. Tegmina corneous, lanceolate, as long as, or shorter than, the body. Wings small, ulnar vein bifurcate. Supra-anal lamina triangular in both sexes, sub-genital lamina of male with styles.

Geographical distribution of species. — Central America.

1. *P. nahua,* Saussure, Rev. Zool. (2), Vol. 20, p. 357 (1868) (Mexico, Guatemala).
2. *P. dohrniana,* Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 49 (1893) (Guatemala).

23. Genus ANISOPYGIA, Saussure

Anisopygia. Saussure, Soc. Ent. Zurich, Vol. 8, p. 57 (1893); Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 49 (1893).

Characters. — Allied to *Ceratinoptera*, Brunner von Wattenwyl. Antennæ slightly incrassated. Pronotum not covering vertex of head. Tegmina corneous, abbreviated. Wings rudimentary. Penultimate abdominal tergite strongly sinuate. Supra-anal lamina in the male divided almost to the base into two unequal lobes; sub-genital lamina in the male asymmetrical with two unequal styles.

Geographical distribution of species. — Guatemala.

1. *A. jocosicluna*, Saussure, Soc. Ent. Zurich, Vol. 8, p. 57 (1893) (Guatemala). — **Plate 2, Fig. 4, 5.**
   A. jocosicluna, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 50, pl. 1, f. 25, 26 (1893).

24. Genus TEMNOPTERYX, Brunner von Wattenwyl

Temnopteryx. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 83 (1865).

Characters. — The same as in *Ceratinoptera*, but the tegmina in both sexes quadrate or obliquely truncate, not extending beyond the second abdominal tergite. Wings usually present, but rudimentary, equalling the tegmina in length.

Geographical distribution of species. — India, Philippines, Samoa, Africa, Madagascar.

1. *T. brachyptera*, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 19, p. 301, pl. 1, f. 2 (1890) (North Africa).
2. *T. abyssinica*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 51, foot-note (1895) (Massowa, Abyssinia). — **Plate 2, Fig. 3.**
   T. saussurei, Bolivar, Ann. Soc. Ent. Fr. Vol. 66, p. 292 (1897).
3. *T. brunneri*, Adelung, Ann. Mus. Zool. St-Pétersb. Vol. 9, p. 433 (1905) (Abyssinia).
4. *T. caffra*, Saussure, Abh. Senckenb. Ges. Frankfurt, Vol. 21, p. 577 (1899) (East Africa).
5. *T. ectobioides*, Shelford, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro etc., pt. 17, Orthoptera, Blattodea, p. 26, pl. 2, f. 12 (1907) (German E. Africa).
6. *T. affinis*, Shelford, ibidem, p. 27 (1907) (Meru, Kilimandjaro).
7. *T. rufa*, Shelford, ibidem, p. 27 (1907) (Kilimandjaro).
8. *T. nana*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 241 (1869) (Senegal).
9. *T. phalerata*, Saussure, Rev. Zool. (2), Vol. 16, p. 309 (1864) (South Africa).
10. *T. inconspicua*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 85 (1865) (Cape Town).
11. *T. elizabethae*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 5, p. 279 (1900) (Cape Colony).
12. *T. sakalava*, Saussure, Soc. Ent. Zurich, Vol. 6, p. 25 (1891) (Madagascar, Zanzibar).
    T. sakalava, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 51, pl. 1, f. 16 (1895).
13. *T. panteli*, Saussure, Soc. Ent. Zurich, Vol. 6, p. 25 (1891) (Madagascar).
    T. panteli, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 52, pl. 1, f. 15 (1895).
14. *T. madecassa*, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 53 (1895) (Madagascar).
15. *T. indica*, Saussure, Mém. Soc Sc. Phys. Nat. Genève, Vol. 17, p. 130 (1864) (Pondicherry, India).
16. *T. truncata*, Saussure, ibidem, p. 148, pl. 1, f. 12 (1864) (Pondicherry, India).
17. *T. alca*, Bolivar, Ann. Soc. Ent. Fr. p. 293, pl. 10, f. 7 (1897) (Trichinopoly, India).
18. *T. bicolor*, Bolivar, ibidem, p. 293 (1897) (Trichinopoly, India).
19. *T. dimidiatipes*, Bolivar, An. Soc. Esp. Hist. Nat. Vol. 19, p. 300, pl. 1, f. 1 (1890) (Philippines).
20. *T. obscura*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 241 (1869) (Samoa).
21. *T. abbreviata*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 164 (1895) (Victoria).

25. Genus LOBOPTERA, Brunner von Wattenwyl

Loboptera. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 79 (1865).

Characters. — Ocelli absent. Vertex of head not covered by the pronotum. Tegmina lobiform and wings absent in both sexes. Abdomen broad. Supra-anal lamina produced, obtuse in the male, emarginate in the female. Sub-genital lamina in the male triangular, obtuse, without styles, in the female ample, emarginate. Femora strongly armed, rather compressed; an arolium present between the tarsal claws.

Geographical distribution of species. — Cosmopolitan.

1. *L. decipiens*, Germar, Reise in Dalmatien, p. 249 (1817) (Southern Europe, Madeira, Asia Minor).
2. *L. fortunata*, Krauss, Zool. Anz. Vol. 15, p. 165 (1892) (Canary Islands).
3. *L. maroccana*, Bolivar, Act. Soc. Esp. Hist. Nat. Vol. 23, p. 84 (1894) (Morocco).
4. *L. minor*, Bolivar, ibidem, p. 85 (1894) (Morocco).
5. *L. tartara*, Saussure, in Fedschenko, Reise in Turkestan, Orth. p. 8, pl. 1, f. 5 (1874) (Turkestan).
6. *L. indica*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 82 (1865) (India).
7. *L. peculiaris*, Burr, Bull. Liverpool Mus. Vol. 2, p. 42 (1900); Nat. Hist. Sokotra, p. 415, pl. 25, f. 8 (1903) (Sokotra). — **Plate 2, Fig. 9.**
8. *L. nitida*, Shelford, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro etc. pt. 17, Orthoptera, Blattodae, p. 28 (1907) (German E. Africa).
9. *L. duplovittata*, Saussure, Soc. Ent. Zurich, Vol. 6, p. 25 (1891) (Madagascar).
10. *L. trivittata*, Erichson, Arch. f. Naturg. Vol. 8, p. 248 (1842) (Tasmania).
11. *L. halmaturina*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 36 (1893) (Kangaroo Isl., Australia).
12. *L. duodecimsignata*, Tepper, ibidem, p. 36 (1893) (Adelaide, Australia).
13. *L. circumcincta*, Tepper, ibidem, p. 37 (1893) (Kangaroo Isl., Australia).
14. *L. tricolor*, Tepper, in Horn, Exped. Centr. Austral. Vol. 2, p. 357 (1896) (Central Australia).
15. *L. extranea*, Perkins, Fauna Hawaii. Orth. p. 6 (1899) (Hawaiian Islands).
16. *L. americana*, Scudder, Proc. Acad. Nat. Sc. Davenport, Vol. 8, p. 93, pl. 2, f. 4 (1899) (Arizona).
17. *L. schaefferi*, Rehn, Psyche, Vol. 11, p. 72 (1904) (South Texas).
18. *L. annulicornis*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 54 (1893) (Mexico).
19. *L. aequalis*, Walker, Cat. Derm. Salt. Vol. 5, Suppl. Blatt. p. 21 (1871) (Brazil).
20. *L. laurenziana*, Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 12, n. 302, p. 2 (1897) (Argentine).
21. *L. borellii*, Giglio-Tos, ibidem, p. 3 (1897) (Argentine, Bolivia).
22. *L. araucana*, Saussure, Rev. Zool. (2), Vol. 21, p. 109 (1869) (Chili).

26. Genus PARALOBOPTERA, Saussure

Paraloboptera. Saussure, Mission Sc. Mexique, Orth. p. 86 (1870).

Characters. — Differs only from *Loboptera*, Brunner von Wattenwyl, in the absence of arolia between the tarsal claws.

Geographical distribution of species. — South America and Abyssinia.

1. *P. unicolor*, Saussure, Rev. Zool. (2), Vol. 20, p. 100 (1868) (Buenos Aires).
2. *P. ras*, Adelung, Ann. Mus. Zool. St-Pétersb. Vol. 9, p. 437 (1905) (Abyssinia).

27. Genus APTEROBLATTA, Shelford

Apteroblatta. Shelford, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro etc., pt. 17. Orthoptera, Blattodea, p. 28 (1907).

Characters. — Allied to *Loboptera*, Brunner von Wattenwyl, but tegmina entirely absent in both sexes. Arolia present.

Geographical distribution of species. — East Africa, Abyssinia.

1. *A. perplexa*, Shelford, Wiss. Ergebn. Schwed. Zool. Exp. Kilimandjaro etc., pt. 17. Orthoptera, Blattodea, p. 28, pl. 2, f. 3, 13 (1907) (Kilimandjaro).
2. *A. adelungi*, Shelford, ibidem, p. 29 (1907) (Abyssinia).

28. Genus ATTAPHILA, Wheeler

Attaphila. Wheeler, The Amer. Natur. Vol. 34, p. 856-862 (1900).

Characters. — Body oval. Head strongly transverse, towards the middle as broad as long. Antennæ with the first joint large, dilated gradually towards the apex and slightly curved, the second small, sub-quadrate, the third and fourth short and transverse, the following increasing distally in length. Eyes very narrow and reduced. Pronotum barely covering vertex of head, posteriorly truncate. Tegmina in male sub-quadrate, with internal posterior angle rounded, reaching to end of the metanotum; absent in the female. Wings absent. Abdomen depressed, broad; penultimate tergite narrow transverse; supra-anal lamina triangular produced in the male, in the female trapezoidal with the posterior border emarginate; sub-genital lamina of male with one style. Cerci short, rounded, not segmented. Legs short, robust, femora armed beneath, tibiæ strongly, spined, tarsal claws with arolia. All the species inhabit ants' nests.

Geographical distribution of species. — Southern United States, South America.

1. *A. fungicola*, Wheeler, The Amer. Natur. Vol. 34, p. 856-862, f. 3-5 (1900) (Texas).
2. *A. bergi*, Bolivar, Comun. Mus. Nac. Buenos Aires, Vol. 1, p. 334 (1901) (Argentine, Uruguay) — **Plate 2, Fig. 11.**
3. *A. sexdentis*, Bolivar, Mitt. Schweiz. Ent. Ges. Vol. 11, p. 137 (1905) (Rio Grande do Sul, Brazil).
4. *A. schuppi*, Bolivar, ibidem, p. 138 (1905) (Porto Alegre, Brazil).
5. *A. aptera*, Bolivar, ibidem, p. 137 (1905) (Colombia).

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EXPLANATION OF PLATES

Plate 1.

Fig. 1. *Pseudomops angusta*, Walker.
— 2. *Pseudomops magna*, Shelford. Left tegmen.
— 3. *Pseudothyrsocera pica*, Walker.
4. *Ischnoptera natalensis*, Walker. ♂ Sub-genital lamina.
— 5. *Ischnoptera bimaculata*, Gerstäcker. Apex of abdomen, ♂, dorsal view.
— 6. *Ellipsidion castaneum*, Shelford.
— 6a. *Ischnoptera inca*, Saussure & Zehntner. Left wing.
— 7. *Pseudophyllodromia angustata*, Latreille.
8. *Pseudophyllodromia laticeps*, Walker. Left tegmen.
— 9. *Pseudophyllodromia hystrix*, Saussure. Left tegmen.
— 10. *Duryodana palpalis*, Walker.
— 11. *Duryodana palpalis*, Walker. Head from below.
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PLATE 2.

Fig. 1. *Phyllodromia marmorata*, Walker.
— 2. *Phyllodromia supellectilium*, Serville. Apex of abdomen, ♂. Dorsal view.
— 3. *Temnopteryx abyssinica*, Saussure & Zehntner.
— 4. *Anisopygia jocosicluna*, Saussure.
— 5. *Anisopygia jocosicluna*, Saussure, Apex of abdomen, ♂. Dorsal view.
— 6. *Ceratinoptera inscripta*, Walker.
— 7. *Allacta spuria*, Brunner von Wattenwyl.
— 8. *Anallacta methanoides*, nov. sp.
— 9. *Loboptera peculiaris*, Burr.
— 10. *Paratemnopteryx blattoides*, Tepper. Apex of abdomen, ♂. Ventral view.
11. *Attaphila bergi*, Bolivar (after Bolivar).

Oxford, May 15th 1908.

Pseudomops angusta

8

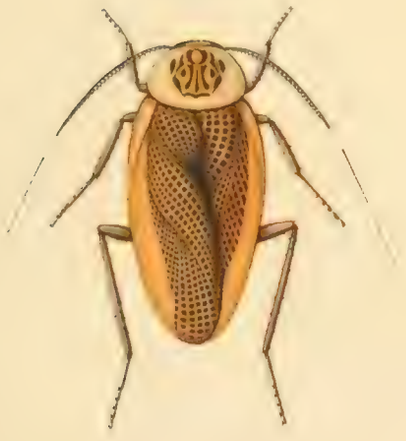
Pseudophyllodromia laticeps

5

Ischnoptera natalensis

Ischnoptera bimaculata

Ischnoptera inca

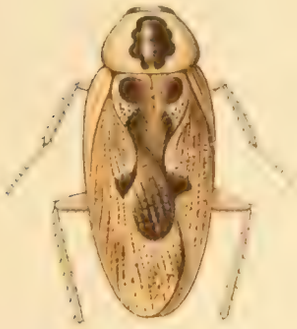


Ellipsidion castaneum

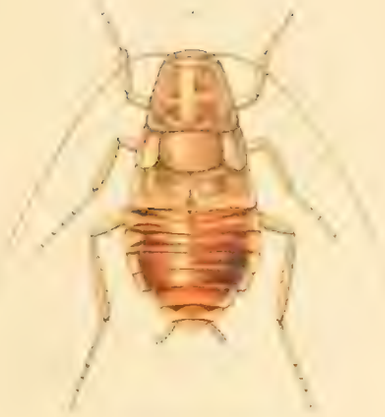
Pseudophyllodromia angustata

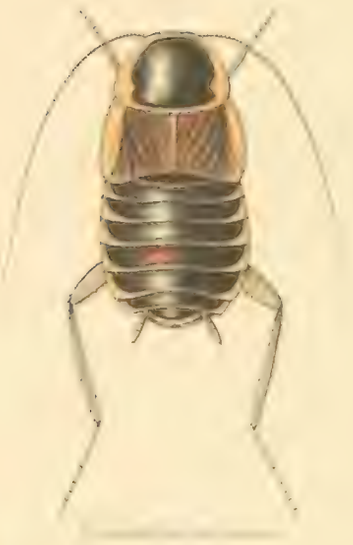
FAM. BLATTIDÆ

SUBFAM. PHYLLODROMIINÆ



Phyllodromia marmorata

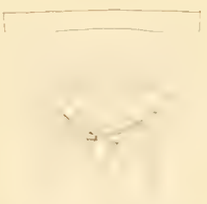




Phyllodromia supellectilium. ♂

Allacta spuria

Allaphila bergi. ♂



Anisopygia jocosiclunis

Anallacta methanoides

Ceratinoptera inscripta

FAM. BLATTIDÆ

SUBFAM. PHYLLODROMIINÆ

ORTHOPTERA

FAM. BLATTIDÆ

SUBFAM. NYCTIBORINÆ

ORTHOPTERA

FAM. BLATTIDÆ

SUBFAM. NYCTIBORINÆ

by R. SHELFORD

WITH 1 COLOURED PLATE

THE Nyctiborinæ form the third division in the classification of the Blattidæ.

Characters. — Antennæ setaceous or plumose and incrassated. Head with the vertex exposed. Tegmina coriaceous and together with the pronotum generally covered with a fine silky pubescence, which in the larvæ extends over the whole body. Tegmina in all but one genus extending beyond the apex of the abdomen. Wings with anterior portion very large, costal veins somewhat irregular and ramose, ulnar vein multiramose, some of the rami incomplete and failing to reach the apex of the wing. Supra-anal lamina produced, triangular, its apex frequently incised slightly; sub-genital lamina of male narrow, slightly asymmetrical and with two styles, of female ample. Cerci long, pointed. Femora variously armed beneath; tarsi with large pulvilli and arolia (1). Ootheca large, flattened.

KEY TO THE GENERA

1. *Tarsi with large pulvilli and arolia.*
   2. *Tegmina and wings longer than the body.*
      3. *Pronotum anteriorly parabolic, femora strongly armed.* 1. Genus NYCTIBORA, Burmeister.
      3'. *Pronotum transversely elliptic, femora sparsely armed.*
         4. *Antennæ incrassated throughout the greater part of their length* . . . . . 2. Genus EUNYCTIBORA, nov. gen.

(1) In *Megaloblatta* however there is no arolium between the tarsal claws and the pulvilli are minute.

4'. *Apical half of antennæ setaceous* . . . . . 3. Genus Paratropes, Serville.
2'. *Tegmina truncate, short, wings minute* . . . . . 4. Genus Heminyctobora, Saussure & Zehntner.
1'. *Tarsi with minute pulvilli and no arolia* . . . . . 5. Genus Megaloblatta, Dohrn.

1. Genus NYCTIBORA, Burmeister

Nyctibora. Burmeister, Handb. Ent. Vol. 2, p. 501 (1838).

Nyctobora. Saussure, Mém. Hist. Nat. Mexique, Blatt. p. 65 (1864).

Characters. — Antennæ setaceous, only slightly incrassated. Pronotum parabolic, posteriorly sub-truncate, sides deflexed. Tegmina with marginal area broad, near apex equal to half the total breadth of the tegmen. Wings rounded with anterior field broader than posterior, semi-corneous, ulnar vein with many rami. Femora strongly armed beneath. Pulvilli large, occupying the entire length of the second, third and fourth tarsal joints. Cerci long, pointed.

Geographical distribution of species. — Central and South America.

1. *N. limbata*, Thunberg, Mém. Acad. Sc. St. Pétersb. Vol. 10, p. 277 (1826) (Brazil). — **Plate, Fig. 5, 9.**
   N. sericea, Burmeister, Handb. Ent. Vol. 2, p. 501 (1838).
   Blatta druryi, Serville, Hist. Nat. Ins. Orth. p. 86 (1839).
   N. terrestris, Saussure, Rev. Zool. (2), Vol. 16, p. 315 (1864); Mém. Mexique, Blatt. p. 68 (1864).
2. *N. brunnea*, Thunberg, Mém. Acad. Sc. St. Pétersb. Vol. 10, p. 278 (1826) (Brazil).
   N. holosericea, Burmeister, Handb. Ent. Vol. 2, p. 502 (1838).
   N. obscura, Saussure, Rev. Zool. (2), Vol. 16, p. 316 (1864); Mém. Mexique, Blatt. p. 67, pl. 1, f. 9 (1864).
3. *N. tomentosa*, Serville, Hist. Nat. Ins. Orth. p. 86 (1839) (Surinam, Brazil).
   ?*N. latipennis*, Burmeister, Handb. Ent. Vol. 2, p. 502 (1838).
4. *N. bohlsii*, Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 12, n. 302, p. 7 (1897) (Paraguay).
5. *N. intermedia*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 105 (1873) (Brazil).
6. *N. humeralis*, Dohrn, Ent. Zeit. Stettin, Vol. 49, p. 129 (1888) (Upper Amazons).
7. *N. tenebrosa*, Walker, Cat. Blatt. Brit. Mus. p. 147 (1868) (Demerara).
8. *N. confusa*, Giglio-Tos, Boll. Mus. Zool. Univ. Torino, Vol. 12, n. 302, p. 7 (1897) (Paraguay).
9. *N. borellii*, Giglio-Tos, ibidem, p. 8 (1897) (Bolivia).
10. *N. glabra*, Giglio-Tos, ibidem, p. 9 (1897) (Bolivia).
11. *N. mexicana*, Saussure, Rev. Zool. Vol. 14, p. 227 (1862) (Mexico).
12. *N. azteca*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 56, pl. 4, f. 34 (1893) (Guatemala). — **Plate, Fig. 2.**
13. *N. noctivaga*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 3 (1903) (Nicaragua).

Doubtful species :

14. *N. lateralis*, Eschscholtz, Entomogr. p. 84 (1822).

2. Genus EUNYCTIBORA, nov. gen.

Characters. — Similar to *Nyctibora*, Burmeister, but the antennæ strongly incrassated throughout the greater part of their length. Pronotum transversely elliptical, its posterior border as arcuate as, or more arcuate than, the anterior border. Sides not deflexed. Femora sparsely armed.

Geographical distribution of species. — South America.

1. *E. crassicornis*, Burmeister, Handb. Ent. Vol. 2, p. 501 (1838) (Brazil).
   Blatta servillei, Serville, Hist. Nat. Ins. Orth. p. 91 (1839).
   Paratropes vestita, Saussure, Rev. Zool. (2), Vol. 16, p. 308 (1864).
2. *E. omissa*, Brancsik, Jahresb. Ver. Trencsin. Comit. Vol. 24, p. 186, pl. 3, f. 1 (1901) (Argentine).
3. *E. bicolor*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 36 (1907) (Peru).
4. *E. nigrocincta*, Shelford, ibidem, p. 37 (1907) (Colombia). — **Plate, Fig. 1.**

3. Genus PARATROPES, Serville

Paratropes. Serville, Hist. Nat. Ins. Orth. p. 117 (1839).
Paratropa. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 148 (1865).

Characters. — Antennæ incrassated and plumose in basal half, the joints moniliform, apical half setaceous. Pronotum transversely elliptical, more arcuate posteriorly than anteriorly, sides not deflexed. Pronotum and tegmina with a sericeous pile. Tegmina pointed, almost lanceolate; marginal area at base more than half the total breadth of the tegmen. Wings pointed. Supra-anal lamina in both sexes produced, sub-triangular; sub-genital lamina of male narrow, asymmetrical with stout, flattened styles, of female large, ample, posteriorly sinuate. Cerci short, sub-spatulate. Femora very sparsely armed.

Geographical distribution of species. — Central and South America.

1. *P. elegans,* Burmeister, Handb. Ent. Vol. 2, p. 493 (1838) (Surinam, Upper Amazons).
   P. bivitta, Walker, Cat Blatt. Brit. Mus. p. 150 (1868).
   P. subsericeus, Saussure, Rev. Zool. (2), Vol. 14, p. 229 (1862).
2. *P. lycoides,* Serville, Hist. Nat. Ins. Orth. p. 118 (1839) (Brazil).
3. *P. aequatorialis,* Saussure, Rev. Zool. (2), Vol. 16, p. 309 (1864); Miss. Sc. Mexique, Orth. p. 74 (1870) (Ecuador, Bolivia).
   P. elegans, Blanchard, in d'Orbigny, Voy. Amér. Mér. Vol. 6, p 215, pl. 26, f. 4 (1846).
   P. lycus, ♀, Saussure, Rev. Zool. (2), Vol. 14, p. 229 (1862).
   P. lanceolatus, Walker, Cat. Blatt. Brit. Mus. p. 150 (1868).
4. *P. phalerata,* Erichson, in Schomburgk, Brit. Guiana, Vol. 3, p. 580 (1848) (Guiana, Brazil).— Plate, Fig. 3, 4.
   P. lycus, ♂, Saussure, Rev. Zool. (2), Vol. 14, p. 229 (1862).
5. *P. pica,* Walker, Cat. Blatt. Brit. Mus. p. 151 (1868) (Ega). — Plate, Fig. 10.
6. *P. mexicana,* Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 151, pl. 4, f. 15 (1865) (Mexico).
   P. lycus, var., Saussure, Rev. Zool. (2), Vol. 14, p. 229 (1862).
7. *P. bilunata,* Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 60 (1893) (Panama).
8. *P. biolleyi,* Saussure & Zehntner, ibidem, p. 60 (1893) (Costa Rica).

4. Genus HEMINYCTOBORA, Saussure & Zehntner

Heminyctobora. Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 55 (1893).

Characters. — Allied to *Nyctibora,* Burmeister, but with the tegmina in both sexes truncate and corneous. Wings minute.

Geographical distribution of species. — Central America.

1. *H. truncata,* Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 56, pl. 4, f. 33 (1893) (Mexico, Guatemala). — Plate, Fig. 8.

5. Genus MEGALOBLATTA, Dohrn

Megaloblatta. Dohrn, Ent. Zeit. Stettin, Vol. 48, p. 408 (1887); Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 56 (1893).

Characters. — Of large size. Antennæ setaceous. Pronotum elliptic, sides not deflexed. Tegmina and wings ample, marginal area of tegmina very broad. Supra-anal lamina produced, sub-quadrate, sub-bilobate, sub-genital lamina of the male narrow, exceeded by the supra-anal lamina, furnished with two slender styles. Penultimate abdominal tergite strongly sinuate in the male, slightly

so in the female. Cerci elongate, pointed. Femora most sparsely armed beneath; pulvilli minute, arolia between tarsal joints absent.

Geographical distribution of species. — Central and South America.

1. *M. longipennis*, Walker, Cat. Blatt. Brit. Mus. p. 8 (1868) (Ecuador, Peru). — **Plate, Fig. 7.**
   M. peruviana, Dohrn, Ent. Zeit. Stettin, Vol. 48, p. 409 (1887).
2. *M. regina*, Saussure, Miss. Scient. Mexique, Orth. p. 116 (1870) (Brazil).
3. *M. blaberoides*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 12 (1871) (Nicaragua, Panama). — **Plate, Fig. 6.**
   M. rufipes, Dohrn, Ent. Zeit. Stettin, Vol. 48, p. 409 (1887).

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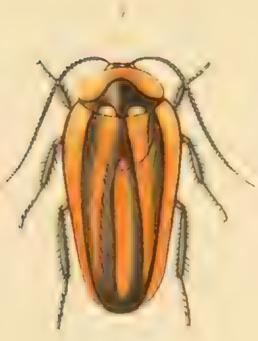
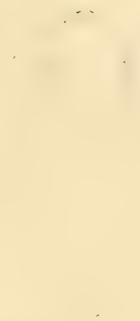
EXPLANATION OF PLATE

Fig. 1. *Eunyctibora nigrocincta*, Shelford.
— 2. *Nyctibora azteca*, Saussure & Zehntner.
— 3. *Paratropes phalerata*, Erichson. Apex of abdomen, ♂, from below.

Fig. 4. *Paratropes phalerata*, Erichson.
5. *Nyctibora limbata*, Thunberg. Apex of abdomen, ♂, from below.
— 6. *Megaloblatta blaberoides*, Walker. Apex of abdomen, ♂, from below.
— 7. *Megaloblatta longipennis*, Walker.
— 8. *Heminyctobora truncata*, Saussure & Zehntner.
– 9. *Nyctibora limbata*, Thunberg.
— 10. *Paratropes pica*, Walker.

Oxford, May 15th 1908.


Paratropes phalerata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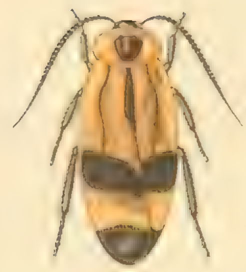
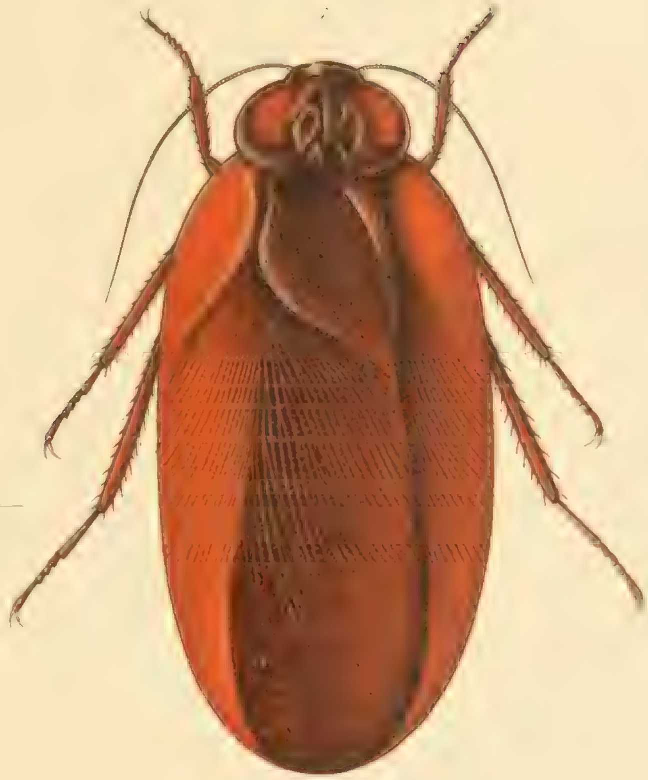
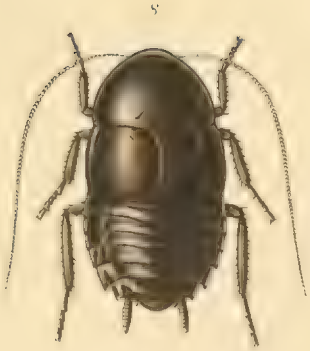
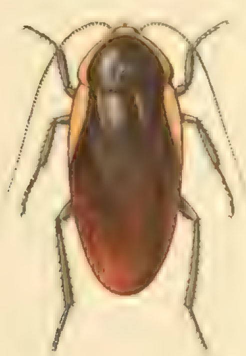

Eunyctibora nigro


Nyctibora limbata ♂


Megaloblatta longipennis
(*Natural size*)


Heminyctobora truncata


Nyctibora limbata

FAM. BLATTIDÆ

SUBFAM. NYCTIBORINÆ

101me FASCICULE ORTHOPTERA

GENERA INSECTORUM

DIRIGÉS PAR

P. WYTSMAN

ORTHOPTERA

FAM. BLATTIDÆ

SUBFAM. EPILAMPRINÆ

by R. SHELFORD

WITH 2 COLOURED PLATES

1910

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FAM. BLATTIDÆ

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by R. SHELFORD

WITH 2 COLOURED PLATES

THE Epilamprinæ form the fourth division in the classification of the Blattidæ.

Characters. — Antennæ setaceous, never plumose, very occasionally incrassated slightly. Pronotum variable in form. Tegmina coriaceous or corneous, fully developed or reduced. Wings fully developed, reduced or absent, mediastinal vein typically multiramose, costal veins irregular, ramose, ulnar vein with several incomplete rami. Supra-anal lamina (♂) more or less quadrate with obtuse angles, (♀) sub-bilobate, produced. Femora armed beneath sparsely or strongly. Tarsi with distinct pulvilli, and in all but one genus with arolia. Ovo-viviparous or viviparous.

This sub-family presents almost as many difficulties to the systematist as the Phyllodromiinæ; Saussure attempted a revision of it in 1895 (*Rev. Suisse Zool.*), but in reality only indicated the lines along which revision should proceed. The most important characters for taxonomic purposes are found in the tarsal structure and as nearly all authors have omitted detailed notice of these characters in their specific diagnoses, no really satisfactory revision can be made until the vast majority of type-specimens are re-examined. The scheme of classification here adopted can only be tentative and extended knowledge of the group will doubtless lead to a shuffling of many species. Further subdivision of the genus *Homalopteryx* based on the form of the tegmina and tarsal structure and of the genera *Calolampra* and *Aüdreia* based on the tarsal structure is possible and, as I believe, desirable, but is postponed until more material for such subdivision comes to hand. *Epilampra* as a genus is as unwieldy as *Phyllodromia* and is even more difficult to deal with; the species of the latter genus do present readily recognisable characters useful for splitting the genus into well-marked sections and the difficulty of the systematist lies mainly in the fact that many authors fail to describe these characters. But in the case of

Epilampra not only are the diagnoses of the species for the most part very vague, but the species themselves are remarkably uniform and often can only be separated with difficulty. Brunner von Wattenwyl with his usual perspicacity has indicated one character which seems to be of great value in dividing *Epilampra* into two sections : 1° with the pronotum punctate, 2° with the pronotum smooth; if these two types of pronotal structure can be shewn to be correlated with definite tarsal differences, the commencement of a reliable subdivision of *Epilampra* will have been made. Kirby has separated off the Old World species of *Epilampra* to form a genus *Heterolampra*, but this genus is described so vaguely that the New World species fit into it as readily as the Old World species. In spite of a careful scrutiny of a considerable number of species I can find no characters whereon to base a division in accordance with geographical limits and for the present I leave *Epilampra* very much as it has been since 1895.

KEY TO THE GENERA

1. *Tarsi very short, posterior metatarsus much shorter than the succeeding joints.*
2. *Form convex.*
3. *Pronotum anteriorly produced covering the vertex of the head. Wings with normal venation* . . . . . 1. Genus Phoraspis, Serville.
3'. *Vertex of head exposed. Wings when present with abnormal venation.*
4. *Wings with triangular apical area* . . . . . 2. Genus Notolampra, Saussure.
4'. *Wings without triangular apical area.*
5. *Wings fully developed in both sexes. Anal vein of tegmina absent in both sexes* . . . . . 3. Genus Thorax, Saussure.
5'. *Wings reduced, rudimentary or absent in ♀. Anal vein of tegmina present in ♂* . . . . . 4. Genus Phlebonotus, Saussure.
2'. *Form depressed.*
3. *Tegmina and wings fully developed in both sexes.*
4. *Pronotum posteriorly sub-truncate. Tarsi fimbriate beneath* . . 5. Genus Pinaconota, Saussure.
4'. *Pronotum posteriorly produced. Tarsi not fimbriate beneath.* . 6. Genus Apsidopis, Saussure.
3'. *Tegmina truncate, quadrate. Wings absent* . . . . . 7. Genus Compsolampra, Saussure.
1'. *Tarsi longer, posterior metatarsus longer than, equal to, or very little shorter than the succeeding joints.*
2. *Posterior metatarsus entirely unarmed beneath.*
3. *Pronotum obtusely produced posteriorly* . . . . . 8. Genus Morphna, nov. gen.
3'. *Pronotum truncate posteriorly* . . . . . 10. Genus Homalopteryx, Brunner von [Wattenwyl (pars).
2'. *Posterior metatarsus spined beneath.*
3. *Posterior metatarsus armed with spines beneath only at the base, its pulvillus produced towards the base of the joint.*
4. *Sexes similar.*
5. *Tegmina and wings fully developed in both sexes* . . . . 10. Genus Homalopteryx, Brunner von [Wattenwyl (pars).
5'. *Tegmina and wings reduced to squamiform rudiments* . . . 11. Genus Opisthoplatia, Brunner von [Wattenwyl.
4'. *Sexes dissimilar* . . . . . 9. Genus Molytria, Stål.
3'. *Posterior metatarsus armed with spines beneath throughout the greater part of its length, its pulvillus apical.*

4. *Pronotum posteriorly truncate* . . . . . 12. Genus PHOETALIA, Stâl.
4'. *Pronotum posteriorly more or less produced* (1).
5. *Tarsal arolia absent* . . . . . 13. Genus ATAXIGAMIA, Tepper.
5'. *Tarsal arolia present.*
6. *Sexes dissimilar.*
7. *Vertex of head covered by the pronotum* . . . . . 14. Genus RHICNODA, Brunner von Wattenwyl.
7'. *Vertex of head exposed.*
8. *Tegmina : (♂) completely developed, (♀) lobiform* . . 15. Genus CALOLAMPRA, Saussure.
8'. *Tegmina : (♂) reduced, (♀) truncate or absent* . . . 16. Genus AÜDREIA, nov. gen.
6'. *Sexes similar.*
7. *Vertex of head covered by the pronotum.*
8. *Pronotum with sub-reflexed margin* . . . . . 17. Genus TRIBONOIDEA, Shelford.
8'. *Pronotum not as above.*
9. *Pulvilli large, second to fourth tarsal joints not spined* . 18. Genus PSEUDOPHORASPIS, Kirby.
9'. *Pulvilli small, second to fourth tarsal joints spined* . . 19. Genus HEDAIA, Saussure & Zehntner.
7'. *Vertex of head exposed.*
8. *Wings truncate or acuminate at apex.*
9. *Wings truncate at apex* . . . . . 20. Genus RHABDOBLATTA, Kirby.
9'. *Wings acuminate at apex* . . . . . 21. Genus DEROCARDIA, Saussure.
8'. *Wings rounded at apex.*
9. *Femora strongly armed* . . . . . 22. Genus EPILAMPRA, Burmeister.
9'. *Femora sparsely armed* . . . . . 23. Genus EUSTEGASTA, Gerstäcker.

1. GENUS PHORASPIS, SERVILLE

Phoraspis, Serville, Ann. Sc. Nat. Vol. 22, p. 43 (1831); Hist. Ins. Orth. p. 124 (1839).
Cyrtilia, Stâl, Bih. Svenska Akad. Vol. 2 (13), p. 11 (1874).

Characters. — Form convex. Antennæ setaceous. Pronotum rhomboidal, posteriorly arcuate, anteriorly covering vertex of head. Tegmina convex, semi-corneous, lanceolate, densely punctate, venation obscured, anal vein absent in both sexes, mediastinal vein on ventral surface incrassated. Wings coloured, ulnar vein sending incomplete rami to dividing vein and several complete rami to apex. Supra-anal lamina : (♂) transverse, (♀) quadrate, apex emarginate. Sub-genital lamina : (♂) broad, transverse with two short styles, (♀) produced, ample, margins sinuate, sub-carinate and with two lateral folds. Cerci short, acuminate. Legs slender, femora sparsely armed; tarsi short, pulvilli large, posterior metatarsus not spined beneath, shorter than succeeding joints.

Geographical distribution of species. — West Indies, Central and South America.

1. *P. pellucens*, Thunberg, Mém. Acad. Sc. St-Pétersb. Vol. 10, p. 276, pl. 14 (1826). Brazil, Surinam.
P. luctuosa, Saussure, Rev. Zool. (2), Vol. 20, p. 356 (1868).
2. *P. convexa*, Thunberg, Mém. Acad. Sc. St-Pétersb. Vol. 10, p. 279 (1826). Brazil. — **Pl. 1, Figs. 1, 1a.**
P. heydeniana, Saussure, Rev. Zool. (2), Vol. 16, p. 309 (1864).
? *P. conspersa*, Burmeister, Handb. Ent. Vol. 2, p. 493 (1838).

(1) Except in the subapterous and apterous forms

3. *P. cassidea*, Dalman, Anal. Ent. p. 87 (1823). Brazil.
4. *P. flavipes*, Blanchard, Ann. Soc. Ent. Fr. Vol. 6, p. 291, pl. 11, f. 2 (1837). Brazil.
5. *P. atomaria*, Blanchard, ibidem, p. 287, pl. 10, f. 2 (1837). Guadeloupe, Brazil.
   P. unicolor, Burmeister, Handb. Ent. Vol. 2, p. 493 (1838).
6. *P. luteola*, Blanchard, Ann. Soc. Ent. Fr. Vol. 6, p. 290, pl. 11, f. 1 (1837). Brazil.
7. *P. pantherina*, Blanchard, ibidem, p. 292, pl. 11, f. 3 (1837). Haiti, Brazil.
8. *P. fastuosa*, Blanchard, ibidem, p. 293, pl. 11, f. 4 (1837). Brazil.
   ? *P. albicollis*, Burmeister, Handb. Ent. Vol. 2, p. 493 (1838).
9. *P. conspersa*, Brullé, Hist. Nat. Ins. Vol. 9, p. 60, pl. 3, f. 4 (1835). Brazil.
10. *P. leucogramma*, Perty, Del. Anim. Art. p. 116, pl. 30, f. 3 (1830). Brazil.
11. *P. picta*, Drury, Ill. Exot. Ent. Vol. 3, pl. 50, f. 3 (1782). Brazil.
    Lampyris rufovittata, Schoenherr, Syn. Ins. Vol. 1 (3), p. 66 (1817).
12. *P. nigra*, Blanchard, Ann. Soc. Ent. Fr. Vol. 6, p. 297, pl. 11, f. 7 (1837). Brazil.
13. *P. modesta*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 161 (1865). Brazil.
14. *P. mexicana*, Saussure, Rev. Zool. (2), Vol. 14, p. 228 (1862). Mexico.
15. *P. bicolor*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 2, p. 161 (1893). C. America (?), Brazil.

2. Genus NOTOLAMPRA, Saussure

Notolampra. Saussure, Rev. Zool. (2), Vol. 14, p. 227 (1862); Mém. Hist. Nat. Mexique, Blatt. p. 139 (1864).

Characters. — Form convex. Pronotum rhomboidal, anteriorly not covering vertex of head. Tegmina corneous, finely punctate, scarcely or not exceeding the apex of the abdomen, venation obscured, anal vein absent in the female. Wings fully developed in both sexes, a prominent apical triangle. Legs as in preceding genus. Supra-anal lamina (♀) triangularly produced, apex emarginate. Cerci short.

Geographical distribution of species. — Brazil, West Indies.

1. *N. gibba*, Thunberg, Mém. Acad. Sc. St-Pétersb. Vol. 10, p. 279 (1826). Brazil.
   — Pl. 1, Fig 2.
   Phoraspis cassidea, Burmeister, Handb. Ent. Vol. 2, p. 493 (1838).
   Epilampra lucida, Saussure, Rev. Zool. (2), Vol. 14, p. 227 (1862).
2. *N. punctata*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 125 (1875). Brazil.
3. *N. antillarum*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 38 (1907). Martinique.

3. Genus THORAX, Saussure

Thorax. Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 141 (1863).
Paraphoraspis. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 163 (1865).

Characters. — Form convex. Pronotum trapezoidal, posteriorly arcuate, anteriorly not covering vertex of head. Tegmina strongly convex, semicorneous, minutely punctate, anal vein not visible. Wings fully developed in both sexes, with very large posterior field, axillary vein giving off near its apex numerous rami; anterior field narrow, dividing vein strongly curved, ulnar vein giving off to it several incomplete rami. Legs as in preceding genus. Supra-anal lamina subtriangularly produced, apex emarginate. Cerci short.

Geographical distribution of species. — India, Ceylon, Australia.

1. *T. porcellana*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 142, pl. 1, f. 9 (1863). Nilghiris, Ceylon, Victoria.
   Paraphoraspis notata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 164, pl. 4, f. 18 (1865).
2. *T. ? castanea*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 18, p. 173 (1894). Victoria.

4. Genus PHLEBONOTUS, Saussure

Phlebonotus. Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 141 (1863).
Planes. Saussure, Mém. Hist. Nat. Mexique, Blatt. p. 141 (1864).

Characters. — Male moderately convex, rather elongate, female very convex. Pronotum punctate, trapezoidal, anteriorly not covering vertex of head, posteriorly sub-truncate. Tegmina : (♂) exceeding the apex of the abdomen, coriaceous, venation well-marked, anal vein impressed, seriately punctate, (♀) not or barely exceeding apex of abdomen, corneous, venation obscure, anal vein absent, seriately punctate Wings : (♂) as long as tegmina, anterior part rather narrow, vena dividens strongly curved, ulnar vein with numerous incomplete rami, posterior part ample, first axillary vein giving off near its apex numerous rami in a flabellate manner, (♀) reduced, rudimentary or absent, in the former case the posterior part is minute, the anterior part coriaceous. Femora very sparsely armed beneath. Tarsi short, metatarsi scarcely as long as the two succeeding joints, not spined beneath; all the pulvilli very large.

Geographical distribution of species. — India, Ceylon, Java.

1. *P. pallens*, Serville, Ann. Sc. Nat. Vol. 22, p. 43 (1831); Hist. Nat. Ins. Orth. p. 125, pl. 3, f. 4 (1839). — **Pl. I, Figs. 3, 4.** Bengal, Assam, Ceylon, Java.
   Epilampra cribrata, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 144, pl. 1, f. 10 (1863).
   Epilampra intacta, Walker, Cat. Blatt. Brit Mus. p. 205 (1868).
2. *P. anomala*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 141, pl. 1, f. 8 (1863). Madras, Pondichery, Nilghiris.

5. Genus PINACONOTA, Saussure

Pinaconota, Saussure, Rev. Suisse Zool. Vol. 3, pp. 333, 337 (1895).

Characters. — Form depressed. Pronotum trapezoidal, anteriorly and posteriorly sub-truncate, deeply punctate. Scutellum exposed. Tegmina and wings fully developed, extending beyond the apex of the abdomen. Femora moderately spined beneath. Tarsi very short, fimbriate and entirely unarmed beneath; posterior metatarsus equal in length to the two succeeding joints, its pulvillus large. Arolia very large.

Geographical distribution of species. — Brazil.

1. *P. bifasciata*, Saussure, Rev. Zool. (2), Vol. 14, p. 165 (1862); Miss. Sc. Mexique. Orth. p. 84, pl. 2, f. 44 (1870). Brazil.
   Ischnoptera sicca, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 149 (1869).
2. *P. obliqua*, Walker, ibidem, p. 148 (1869). Brazil.
   P. obliqua, Shelford, Trans. Ent. Soc. Lond. p. 496, pl. 30, f. 5 (1906).

6. Genus APSIDOPIS, Saussure

Apsidopis, Saussure, Rev. Suisse Zool. Vol. 3, p. 338 (1895).

Characters. — Eyes very convex, not widely separated on vertex of head. Pronotum cucullate, anteriorly produced completely covering the head, posteriorly strongly produced. Tegmina and wings completely developed in both sexes, the latter sometimes with acuminate apex. Femora moderately armed. Tarsi short, completely unarmed beneath, sometimes fimbriate; posterior metatarsus equal in length to the two succeeding joints, all the pulvilli very large.

Geographical distribution of species. — Borneo.

1. *A. cyclops*, Saussure, Rev. Suisse Zool. Vol. 3, p. 338, pl. 9, f. 7 (1895). Borneo.
2. *A. wallacei*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 38 (1907). Borneo.
3. *A. oxyptera*, Walker, Cat. Blatt. Brit. Mus. p. 199 (1868). — **Pl. I, Fig. 5.** Borneo.

7. Genus COMPSOLAMPRA, Saussure

Compsolampra. Saussure, Soc. Ent. Zurich, Vol. 8, p. 58 (1893).

Characters. — Pronotum covering vertex of head, posteriorly truncate. Tegmina quadrate, not extending beyond the first abominal tergite. Wings absent. Femora sparsely armed, front femora unarmed on front margin beneath. Tarsi very short; posterior metatarsi shorter than the three succeeding joints, entirely unarmed beneath, their pulvilli large, produced towards the base.

Geographical distribution of species. — Java, China.

1. *C. liturata*, Serville, Hist. Nat. Ins. Orth. p. 103 (1839). — **Pl. I, Fig. 6.** Java, China.
   Periplaneta insolita, Walker, Cat. Blatt. Brit. Mus. p. 146 (1868).
   Epilampra quadrata, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 129 (1873).

8. Genus MORPHNA, nov. gen.

Molytria. Saussure, Rev. Suisse Zool. Vol. 3, p. 333 (1895).

Characters. — Form rather depressed. Vertex of head covered or almost covered by pronotum, which is trapezoidal, sub-cucullate and posteriorly produced obtusely. Tegmina and wings fully developed exceeding the apex of the abdomen. Supra-anal lamina of typical Epilamprine shape. Cerci moderately long. Femora moderately armed beneath. Posterior metatarsus equal in length to succeeding joints; all the joints entirely unarmed beneath, their pulvilli large, pulvillus of metatarsus apical but produced towards the base of the joint.

Geographical distribution of species. — India to Malay Archipelago.

1. *M. amplipennis*, Walker, Cat. Blatt. Brit. Mus. p. 196 (1868). Silhet.
2. *M. plana*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 183 (1865). India, Ceylon.
   Epilampra punctifera, Walker, Cat. Blatt. Brit. Mus. p. 198 (1868).
   Homaloptera biplagiata, Bolivar, Ann. Soc. Ent. Fr. Vol. 66, p. 296 (1897).
3. *M. maculata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 179 (1865). — **Pl. I, Figs. 7, 7a.** Singapore, Borneo.
   Epilampra polyspila, Walker, Cat. Blatt. Brit. Mus. p. 197 (1868).
   Molytria shelfordi, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 275 (1903).

4. *M. badia*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 180 (1865). — Singapore, Sumatra, Borneo, Java.
Epilampra dotata, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 130 (1869).
Epilampra ramifera, Walker, ibidem, p. 132 (1869).

9. Genus MOLYTRIA, Stål

Molytria. Stål, Bih. Svensk. Akad. Vol. 2 (13), p. 12 (1875).

Characters. — Form depressed. Pronotum trapezoidal, anteriorly not covering vertex of head, posteriorly very obtusely produced. Tegmina : (♂) exceeding the apex of the abdomen or falling little short of it, (♀) sub-quadrate not extending beyond the second abdominal tergite. Wings : (♂) as long as tegmina, (♀) minute, sub-squamiform. Posterior metatarsi as long as the succeeding joints, armed at its base with a few spines in a double row, its pulvillus produced towards the base of the joint; remaining joints with large pulvilli entirely unarmed beneath.

Geographical distribution of species. — Australia.

1. *M. inquinata*, Stål, Freg. Eugen. Resa, Ins. p. 309 (1858). — **Pl. I, Fig. 8.** — Australia.
Epilampra nudiventris, Saussure, Rev. Zool. (2), Vol. 16, p. 321 (1864).
Epilampra notabilis, Walker, Cat. Blatt. Brit. Mus. p. 202 (1868).
2. **M. perplexa, nov. sp.** (1). — Victoria.

10. Genus HOMALOPTERYX, Brunner von Wattenwyl

Homalopteryx. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 195 (1865).

Characters. — Form depressed. Pronotum anteriorly parabolic, completely covering or just failing to cover the vertex of the head, posteriorly truncate or sub-truncate. Tegmina and wings fully developed or reduced. Femora sparsely armed. Posterior metatarsi shorter than, or equal to, the remaining joints, armed beneath with a few spines at the base uniseriately or biseriately arranged, occasionally unarmed beneath.

Geographical distribution of species. — India to Malay Archipelago, Papuasia, Australia (?), S. America.

1. *H. patinifera*, Bolivar, Ann. Soc. Ent. Fr. Vol. 66, p. 295 (1897). — Trichinopoly.
2. *H. decolyi*, Bolivar, ibidem, p. 294 (1897). — Trichinopoly.
3. *H. cariniceps*, Bolivar, ibidem, p. 296 (1897). — Trichinopoly.
4. *H. auriculata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 181 (1865). — Bengal.
5. **H maindroni, nov. sp.** (2). — **Pl. I, Fig. 9.** — Malabar coast.

(1) **M. perplexa, nov. sp.** — *Male.* — Head castaneous, vertex piceous, antennæ fuscous. Pronotum piceous, laterally margined with hyaline mottled with castaneous. Tegmina extending to ante-penultimate abdomial tergite, castaneous, costal margins testaceous, mediastinal vein piceous. Wings a little shorter than tegmina. Abdominal tergites slightly plicated, a pair of spiracular tubes projecting from beneath the seventh abdominal tergite. Supra-anal lamina trapezoidal, barely exceeded by the sub-genital lamina (cerci and tarsi mutilated). Length 27 mm.; length of tegmina 19 mm.; pronotum 7 mm. × 6.8 mm. Victoria, Gippsland (Melbourne Museum).

(2) **H. maindroni, nov. sp.** — *Female.* — Rufo-testaceous. Vertex of head with fuscous markings. Pronotum anteriorly barely covering vertex of head, posteriorly sub-truncate, deeply punctate, disc with two oblique impressions. Tegmina broad, not extending beyond the penultimate abdominal tergite, seriate-punctate. Wings minute, squamiform. Abdomen with tergites posteriorly plicated, beneath testaceous, sprinkled with castaneous; supra-anal lamina produced, sub-quadrate, apex very slightly emarginate. Cerci short. Front femora with three spines on anterior margin beneath, remaining femora very sparsely armed; formula of apical spines 0/1, 1 1, 0 0. Posterior metatarsi equal in length to the three succeeding joints, entirely unarmed beneath, its pulvillus apical. Total length 20 mm.; length of tegmina 17 mm.; pronotum 8.5 mm. × 13 mm. Mahé, Malabar (Maindron coll.) (Paris Museum).

6. *H. templetonii*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 275 (1903). — Ceylon.
7. *H. adusta*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 132 (1869). — Borneo.
H. adusta, Shelford, Trans. Ent. Soc. Lond. p. 497, pl. 30, f. 6 (1906).
8. *H. major*, Saussure, Rev. Suisse Zool. Vol. 3, p. 342 (1895). — Java.
9. *H. macassariensis*, Haan, in Temminck, Verhandel. Orth. p. 51, pl. 18, f. 7 (1842). — **Pl. 1, Fig. 10.** — Philippines, Celebes, Amboina, Ceram.
Epilampra basifera, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 132 (1869).
Epilampra strigifrons, Walker, ibidem, p. 132 (1869).
10. *H. pelewensis*, Saussure, Rev. Suisse Zool. Vol. 3, p. 342 (1895). — Pelew Islands.
11. *H. intermedia*, Bolivar, Act. Soc. Esp. Hist. Nat. p. 137 (1898). — « Papua ».
12. *H. capucina*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 196, pl. 5, f. 21 (1865). — Venezuela, Columbia.

Doubtful species :

13. *H. geochroma*, Walker, Cat. Blatt. Brit. Mus. p. 158 (1868). — Habitat (?).

11. Genus OPISTHOPLATIA, Brunner von Wattenwyl

Opisthoplatia, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 198 (1865).

Characters. — Depressed, oblong. Pronotum anteriorly parabolic, covering vertex of head, posteriorly truncate. Tegmina and wings in both sexes reduced to squamiform lobes. Cerci very short. Sub-genital lamina (♂) with two styles. Posterior metatarsus unarmed beneath and with a large pulvillus prolonged towards the base of the joint, as long as the three succeeding joints.

Geographical distribution of species. — China, India, Brazil (?).

1. *O. orientalis,* Burmeister, Handb. Ent. Vol. 2, p. 482 (1838). — China, India, Brazil (?).
Nympha aptera (part), Stoll, Spectres, Blatt. p. 8, pl. 5*d*, f. 25 (1813).
Polyzosteria pictetiana, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 131, pl. 1, f. 1 (1863).

12. Genus PHÆTALIA, Stål

Phætalia, Stål, Bih. Svensk. Akad. Vol. 2 (13), p. 17 (1875).

Characters. — Form depressed. Pronotum trapezoidal, anteriorly not covering the vertex of the head, posteriorly truncate. Scutellum exposed. Tegmina and wings similar in both sexes, not or barely exceeding the apex of the abdomen. Femora sparsely armed, front femora with a few spines on anterior margin beneath. Tarsi moderately long, posterior metatarsi equal in length to succeeding joints, biseriately spined beneath, remaining joints not armed.

Geographical distribution of species. — Atlantic Islands, Mascarene Islands, South America, West Indies.

1. *P. laevigata,* Beauvois, Ins. Afr. Amér. Orth. p. 228, pl. 2*c*, f. 4 (1805). — Teneriffe, Haiti, Cuba, Brazil.
Nauphoeta pallida, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 286 (1865).
Nauphoeta marginalis, Walker, Cat. Blatt. Brit. Mus. p. 41 (1868).
2. *P. circumvagans*, Burmeister, Handb. Ent. Vol. 2, p. 508 (1838). — Madeira, Teneriffe, Mascarene Islands, Cuba, St. Domingo, Brazil.
P. marginicollis, Stål, Freg. Eugen. Resa Ins. p. 307 (1858).
P. laevigata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 285, pl. 7, f. 33 (1865).

13. Genus ATAXIGAMIA, Tepper

Ataxigamia. Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 123 (1893).

Characters. — Eyes wide apart. Pronotum anteriorly truncate, freely exposing vertex of head, posteriorly produced obtusely, disc rugose with impressions, margins slightly reflected. Scutellum exposed. Tegmina and wings fully developed, exceeding the apex of the abdomen considerably; anal field of tegmina narrow, lanceolate. Supra-anal lamina (♂) sub-quadrate, apex not emarginate, subgenital lamina trapezoidal, symmetrical, notched in the middle of the posterior margin; styles small. Cerci short. Legs with more or less abundant pubescence. Femora sparsely armed. Tarsi moderately long; posterior metatarsus equal to the succeeding joints in length, biseriately spined beneath, its pulvillus small, apical; the remaining joints spined. Arolia absent.

Geographical distribution of species. — Australia.

1. *A. tatei*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 123 (1893). S. Australia.
2. **A. bicolor, nov. sp.** (1). — **Pl. 1, Fig. 11.** S. Australia.

14. Genus RHICNODA, Brunner von Wattenwyl

Rhicnoda. Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 30 (1893).

Characters. — Form depressed. Pronotum anteriorly parabolic, covering vertex of head, in ♂ posteriorly produced, in ♀ truncate. Tegmina and wings fully developed in ♂, tegmina reduced to squamiform lobes or absent and wings absent in ♀. Abdomen (♀) with a pair of spiracular tubes projecting on either side from beneath the seventh tergite. Femora moderately spined. Tarsi long, posterior metatarsi biseriately spined beneath, longer than the succeeding joints, pulvilli apical, remaining joints with spines surrounding their pulvilli.

Geographical distribution of species. — Tropical Asia, Japan, Australia, West Indies, Central America.

1. *R. rugosa*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 31, pl. [illegible] Burma, Borneo, Java, Hal[illegible]
2. *R. terranea*, Walker, Cat. Blatt. Brit. Mus. p. 163 (1868). Ceylon.
3. *R. plicata*, Navás, Bol. Soc. Aragon, Vol. 3, p. 130 (1904). Himalayas.
4. *R. desidiosa*, Rehn, Proc. U. S. Nat. Mus. Vol. 27, p. 552 (1904). Siam.
5. *R. spinulosa*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 31 (1893). Java.
6. *R. natatrix*, Shelford, The Zoologist, p. 226 (1907). — **Pl. 2, Figs. 1.** Borneo.
7. *R. obscurifrons*, Stál, Oefv. Vet.-Akad. Förh. Vol. 34 (10), p. 34 (1877). Philippines.
8. *R. maculata*, Shiraki, Ann. Zool. Japon. Vol. 6, p. 32, pl. 2, f. 4 (1906). Japan.
9. *R. laminata*, Brunner von Wattenwyl, Proc. Zool. Soc. Lond. p. 294, pl. [illegible] West Indies.
10. *R. reflexa*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 68, pl. 4, f. 35 (1893). Nicaragua.

(1) **A. bicolor, nov. sp.** — *Male.* — Bright rufo-testaceous, tegmina and wings castaneous. Head with shallow punctures. Pronotum hexagonal with rounded angles, disc sub-rugose with two oblique impressions and some shallow punctures. Tegmina with mediastinal field and veins at base rufous. Posterior margins of abdominal sternites with one row of small tubercles. Legs with very sparse erect pubescence. Front femora with five spines on anterior margin, three on posterior margin, beneath, remaining femora rather strongly armed. Pulvilli of tarsal joints strongly spined, the apical tarsal joint biseriately spined beneath. Total length 46 mm.; length of body 34 mm.; length of tegmina 38 mm.; pronotum 10 mm × 14.2 mm. South Australia, Tennant's Creek (Oxford Museum)

15. Genus CALOLAMPRA, Saussure

Calolampra. Saussure, Soc. Ent. Zurich, Vol. 8, p. 57 (1893); Rev. Suisse Zool. Vol. 3, p. 344 (1895).

Characters. — Vertex of head in ♂ freely exposed, in ♀ sometimes covered. Pronotum : (♂) posteriorly produced obtusely, (♀) truncate. Tegmina : (♂) long, considerably exceeding the apex of the abdomen, (♀) lobiform. Wings : (♂) as long as the tegmina, (♀) absent. Abdomen in ♀ very broad. Femora rather sparsely armed beneath. Tarsi long, posterior metatarsi longer than the succeeding joints spined beneath, second joint not spined with large pulvillus, or with spines round the pulvillus, or with spines beneath and apical pulvillus.

Geographical distribution of species. — Indian Empire, Siam, Australia, S. and E. Africa, Central America (?).

1. *C. characterosa*, Walker, Cat. Blatt. Brit. Mus. p. 209 (1868). — Bengal.
2. *C. marginata*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 28, pl. 1, f. 1, 1a (1893). — Burma.
3. *C. laevis*, Brunner von Wattenwyl, ibidem, p. 28 (1893). — Tenasserim.
4. *C. pedisequa*, Rehn, Proc. U. S. Nat. Mus. Vol. 27, p. 547 (1904). — Siam.
5. *C. irrorata*, Fabricius, Syst. Ent. p. 272 (1775). — Australia.
   Epilampra gracilis, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 170, pl. 4, f. 20 (1865).
   Epilampra atomifera, Walker, Cat. Blatt. Brit. Mus. p. 69 (1868).
   Polyzosteria propria, Walker, ibidem, p. 161 (1868).
6. *C. fornicata*, Saussure, Rev. Zool. (2), Vol. 16, p. 320 (1864). — Australia.
7. *C. depolita*, Brancsik, Jahresb. Ver. Trencsin. Comit. Vol. 19-20, p. 57 (1897). — Australia.
8. *C. aspera*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 62 (1893). — S. and W. Australia.
9. *C. fraserensis*, Tepper, ibidem, p. 59 (1893). — S. and W. Australia.
10. *C. obscura*, Tepper, ibidem, p. 64 (1893). — Australia.
11. *C. paula*, Tepper, ibidem, p. 60 (1893). — S. Australia.
12. *C. tepperi*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 275 (1903). — Australia.
    Epilampra propria, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 64 (1893).
13. *C. marginalis*, Walker, Cat. Blatt. Brit. Mus. p. 119 (1868). — W. Australia.
14. *C. pardalina*, Walker, ibidem, p. 68 (1868). — S. Africa.
15. *C. aptera*, Schulthess, Ann. Mus. Stor. Nat. Genova, Vol. 39, p. 169, pl. 2, f. 2 (1898). — Kilimandjaro, German East Africa.
16. *C. bispinosa*, Saussure, Soc. Ent. Zurich, Vol. 8, p. 58 (1893). — New Granada, Panama.
    C. bispinosa, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 67, pl. 3, f. 26 (1893).
17. *C. brevitarsis*, Saussure, Soc. Ent. Zurich, Vol. 8, p. 38 (1893). — New Granada, Panama.
    C. brevitarsis, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 67, pl. 4, f. 39 (1893).
18. *C. atra*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 65 (1893). — S. Australia.
19. *C. latei* (1), Tepper, ibidem, Vol. 18, p. 174 (1894). — S. Australia, Northern territory.
20. *C. antica*, Walker (larva), Cat. Blatt. Brit. Mus. p. 161 (1868). — Habitat (?).
21. *C. dimorpha*, Shiraki, Ann. Zool. Japon. Vol. 6, Pt. 1, p. 22, pl. 2, f. 6 (1906). — Japan.
    Polyzosteria congrua, Walker, Cat. Blatt. Brit. Mus. p. 165 (1868), from Congo, included by Kirby in the genus *Calolampra*, is a species of *Temnopteryx*.

1) This species is possibly not an Epilamprine

16. Genus AÜDREIA, nov. gen.

Characters. — Differs from *Calolampra* by the reduced tegmina of the ♂, which fail to reach the apex of the abdomen and by the tegmina of the ♀, which are sub-quadrate or absent.

Geographical distribution of species. — India, Australia, Central and South America, West Indies.

1. **A. pulchra, nov. sp.** (1). — **Pl. 2, Figs. 2, 2a.**	Nilghiris.
2. *A. truncata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 178 (1865).	New S. Wales
3. *A. biolleyi*, Saussure, Rev. Suisse Zool. Vol. 3, p. 347, pl. 9, f. 8 (1895).	C. America.
4. *A. carinulata*, Saussure, ibidem, p. 347, pl. 9, f. 9 (1895).	C. America.
5. *A. cicatricosa*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 275 (1903).	Costa Rica.
6. *A. hamiltoni*, Rehn, ibidem, p. 274 (1903).	Cuba.
7. *A. heusseriana*, Saussure, Rev. Zool. (2), Vol. 16, p. 321 (1864); Mém. Hist. Nat. Mexique, Blatt, p. 134, pl. 2, f. 24 (1864).	Uruguay.
8. **A. catharina, nov. sp.** (2).	Brazil.

17. Genus TRIBONOIDEA, Shelford

Tribonoidea, Shelford, Jahresb. Ver. Naturk. Wiesbaden, Vol. 61, p. 29 (1908).

Characters. — Pronotum with disc cucullate, anteriorly more arcuate than posteriorly, covering vertex of head and with slightly reflected margin. Tegmina and wings considerably exceeding the apex of the abdomen. Mediastinal vein of tegmina láminate beneath. Posterior portion of wings relatively small. Supra-anal lamina (♂) bilobed, exceeding the sub-genital lamina. Two genital styles. Cerci very short. Femora with their posterior margins beneath unarmed, the anterior margins sparsely armed. Tarsi elongate, posterior metatarsus biseriately spined beneath, pulvilli minute.

Geographical distribution of species. — Peru.

1. *T. oniscosoma*, Saussure Rev. Suisse Zool. Vol. 3, p. 339 (1895). *T. seydi*, Shelford, Jahresb. Ver. Naturk. Wiesbaden, Vol. 61, p. 30 (1908).	Peru.

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(1) **A. pulchra, nov. sp.** — *Male.* — Head piceous, vertex with a testaceous line, gena and mouth parts testaceous. Pronotum with the disc fusco-castaneous, the anterior and lateral margins testaceous, rufo-punctate. Tegmina short, not reaching beyond the fifth abdominal tergite, venation well-marked closely reticulated, mediastinal area punctate, testaceous, rest of tegmina castaneous with fuscous spots, mediastinal and radial veins at base piceous. Wings reduced to corneous scales. Abdomen above piceous, laterally testaceous and fusco-punctate, supra-anal lamina sub-quadrate, apex cleft. Abdomen beneath piceous, sub-genital lamina slightly asymetrical, margined with testaceous, with two slender styles. Cerci moderate. Legs castaneous, front femora with four or five spines on anterior margin beneath; formula of apical spines 1/0, 1/0, 1/0, no genicular spine on front femora. Posterior tarsi very long, pulvilli minute, apical; metatarsi, second and third joints spined beneath. Arolia minute.

Female. — Larger. Entirely apterous. Pronotum posteriorly truncate; thorax margined laterally with fusco-punctate testaceous. Abdomen above fusco-marmorate, beneath piceous. Cerci very short, trigonal, nitid above with a testaceous line, hirsute below. Supra-anal lamina sub quadrate, apex faintly emarginate. Length: (♂) 15 mm., (♀) 10 mm.; length of tegmina 7-9 mm.; pronotum: (♂) 5 mm. × 5.5 mm., (♀) 5 mm. × 7.2 mm. Nilghiris, Coonoor (Maindron, Paris Museum).

(2) **A. catharina, nov. sp.** — *Male.* — Rufo-testaceous, a castaneous macula on the frons. Pronotum posteriorly produced obtusely, fusco-punctate, a castaneous lyrate marking on the disc. Tegmina not extending beyond the fourth abdominal tergite, with a few castaneous points, venation well-marked, not reticulated. Wings slightly shorter than tegmina, posterior part reduced, venation reticulated. Abdomen above fusco-marmorate, beneath castaneous, supra-anal lamina shortly trigonal, exceeded by the sub-genital lamina which is asymmetrical and produced, deeply grooved on the right side for the reception of the solitary style. Cerci piceous. Femora and coxæ rufo-testaceous, tibiæ castaneous. Femora strongly armed, front femora on anterior margin beneath with five or six spines succeeded distally by piliform setæ. formula of apical spines 2/1, 1/1, 1/0, no genicular spines on front femora. Tarsi rather short, pulvilli large, posterior metatarsi barely equal in length to the succeeding joints, the pulvilli of the second and third joints occupying the entire extent of the joints with two spines on each side.

Female. — Similar, but pronotum less produced posteriorly, tegmina quadrate, not extending beyond the first abdominal tergite; wings reduced to corneous scales, without venation; supra-anal lamina produced with rounded angles, apex not emarginate. Length: (♂) 10 mm., (♀) 22 mm.; length of tegmina: (♂) 10 mm., (♀) 6 mm.; pronotum 6-7 mm. × 7-8-0 mm. Brazil, Santa Catharina (Oxford Museum).

18. Genus PSEUDOPHORASPIS, Kirby

Pseudophoraspis. Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 275 (1903).

Characters. — Eyes rather close together. Pronotum completely covering vertex of head, subcucullate, posteriorly obtusely produced. Tegmina and wings fully developed in both sexes, their apices rounded or slightly truncate. Femora moderately armed beneath. Tarsi long, posterior metatarsi longer than the succeeding joints, biseriately spined beneath, its pulvillus apical, remaining joints with large pulvilli, entirely unarmed.

Geographical distribution of species. — Tonkin, Malay Peninsula, Sunda Islands, Philippines.

1. **P. fruhstorferi, nov. sp.**(1). — **Pl. 2, Fig. 3.** — Tonkin.
2. *P. nebulosa*, Burmeister, Handb. Ent. Vol. 2, p. 505 (1838). — **Pl. 2, Fig. 4.** — Malay Peninsula, Borneo, Sumatra, Java.
   Blatta jaspidea, Serville, Hist. Nat. Ins. Orth. p. 88 (1839).
   Epilampra congrua, Walker, Cat. Blatt. Brit. Mus. p. 199 (1868).
   Epilampra scita, Walker, ibidem, p. 200 (1868).
   Epilampra conformis, Walker, ibidem, p. 200 (1868).
   Epilampra deplanata, Walker, ibidem, p. 201 (1868).
3. *P. miranda*, Shelford, Trans. Ent. Soc. Lond. p. 268 (1906). — Borneo.
4. *P. vasta*, Walker, Cat. Blatt. Brit. Mus p. 195 (1868). — Philippines.
   Epilampra imperatoria, Stål. Oefv. Vet.-Akad. Förh. Vol. 34, n° 10, p. 36 (1877).

19. Genus HEDAIA, Saussure & Zehntner

Hedaia, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, pp. 56, 66 (1895).

Characters. — Pronotum pentagonal, anterior border moderately arched, almost covering vertex of head, sides truncated, posteriorly strongly produced. Tegmina and wings fully developed, the former membranous, the latter with apex rounded or slightly angulate. Femora very sparsely armed, apical spines small. Tarsi long, posterior metatarsus biseriately spined beneath, second joint also biseriately spined beneath and with apical pulvillus.

Geographical distribution of species. — Madagascar.

1. *H. venusta*, Saussure & Zehntner, Hist. Nat. Madag. Orth. Vol. 1, p. 67, pl. 4, f. 43 (1895). — Madagascar.

20. Genus RHABDOBLATTA, Kirby

Rhabdoblatta, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 276 (1903).

Characters. — Vertex of head freely exposed. Pronotum with its greatest width behind the middle, posteriorly strongly produced. Tegmina and wings fully developed, the latter(2) truncate at the

(1) **P. fruhstorferi, nov. sp.** — Closely allied to *P. nebulosa*, Burmeister, but the eyes much further apart; less convex; pronotum and tegmina less nitid; mediastinal vein of tegmina shining luteous; supra-anal lamina (♂) triangularly produced, apex not emarginate. Total length : (♂) 41 mm., (♀) 39 mm.; length of body : (♂) 33.2 mm., (♀) 34.5 mm.; length of tegmina : (♂) 35 mm., (♀) 33.5 mm.; pronotum : (♂) 9 mm. × 12 mm., (♀) 10 mm. × 14.3 mm. Tonkin, Montes Mauson (Fruhstorfer) (Oxford Mus.).

(2) Except in *R. fruhstorferi*, Saussure.

apex, the former sometimes truncate at the apex, sometimes rounded. Femora moderately armed. Tarsi long, posterior metatarsus biseriately spined beneath, second and third joints with no spines at their bases, pulvilli large with spines at the sides.

Geographical distribution of species. — India to Malay Archipelago. Brazil.

1. *R. praecipua*, Walker, Cat. Blatt. Brit. Mus. p. 196 (1868). — **Pl. 2, Figs. 5, 5a.** Ceylon.
2. *R. horologica*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 280 (1903). Khasia Hills
3. *R. imperatrix*, Kirby, ibidem, p. 274 (1903). Tonkin.
4. *R. regina*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 270 (1869). Cochin China.
5. *R. abdominalis*, Kirby, ibidem, p. 279 (1903). Tonkin.
6. *R. structilis*, Rehn, Bull. Amer. Mus. Nat. Hist. Vol. 26, p. 178 (1909). Sumatra.
7. *R. pfeifferae*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 188 (1865). Borneo.
8. *R. parvicollis*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 133 (1869). Borneo.
9. *R. buqueti*, Serville, Hist. Nat. Ins. Orth. p. 93 (1839). Java.
10. *R. javanica*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 269 (1869). Java.
11. *R. procera*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 192 (1865). Java.
    Epilampra borrei, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 127, pl. 10, f. 44 (1873).
12. *R. pudica*, Stål, Oefv. Vet.-Akad. Förh. Vol. 34, n. 10, p. 35 (1877). Philippines.
13. *R. truncata*, Brunner von Wattenwyl, Abh. Senckenb. Ges. Frankf. Vol. 24, p. 207 (1898). Celebes.
14. *R. concinnula*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 134 (1869). Timor.
15. *R. yersiniana*, Saussure, Rev. Zool. (2), Vol. 16, p. 323 (1864). Brazil.
    Epilampra superba, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 191 (1865).

21. Genus DEROCARDIA, Saussure

Derocardia. Saussure, Rev. Suisse Zool. Vol. 3, p. 350 (1895).

Characters. — Similar to *Rhabdoblatta*, but apex of wings acutely pointed.

Geographical distribution of species. — Amboina.

1. *D. acutipennis*, Saussure, Rev. Suisse Zool. Vol. 3, p. 353, pl. 9, f. 11 (1895). Amboina.

22. Genus EPILAMPRA, Burmeister

Epilampra. Burmeister, Handb. Ent. Vol. 2, p. 504 (1838).
Pœciloderrhis. Stål, Bih. Svensk. Vet.-Akad. Handl. Vol. 2, n. 13, p. 12 (1874).
Heterolampra. Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 276 (1903).

Characters. — Head with vertex exposed. Pronotum obtusely produced posteriorly. Tegmina and wings fully developed in both sexes, only rarely shorter than the body. Supra-anal lamina: (♂) sub-quadrate with obtuse angles, (♀) sub-bilobate, produced. Femora strongly armed. Tarsi long; posterior metatarsi exceeding the succeeding joints in length, biseriately spined throughout the greater part of their length, their pulvilli apical; second to fourth joints typically with small pulvilli and biseriately spined beneath.

Geographical distribution of species. — St. Helena, Asia, Africa, Australia, Central and South America, West Indies.

Palæarctic species :

1. *E. signatura*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 13 (1871). — St. Helena.
2. *E. guttigera*, Shiraki, Ann. Zool. Japon. Vol. 6, Pt. 1, p. 21, pl. 2, f. 7 (1906). — Japan.

Ethiopian species :

3. *E. lyncea*, Gerstäcker, Mitt. Ver. Neuvorpomm. u. Rügen, Vol. 14, p. 53 (1883). — Cameroons.
4. *E. erubescens*, Gerstäcker, ibidem, p. 54 (1883). — Cameroons.
5. *E. camerunensis*, Borg, Bih. Svensk. Vet.-Akad. Vol. 28, Afd. 4, n. 10, p. 8, pl. 1, f. 3 (1904). — Cameroons.
6. *E. electa*, Borg, ibidem, p. 10, pl. 1, f. 4 (1904). — Cameroons.
7. *E. infinita*, Borg, ibidem, p. 11, pl. 1, f. 1 (1904). — Cameroons.
8. *E. sjöstedti*, Borg, ibidem, p. 12, pl. 1, f. 5 (1904). — Cameroons.
9. *E. borgi* (nom. nov.). — Cameroons.
   E. fallida, Borg, Bih. Svensk. Vet.-Akad. Vol. 28, Afd. 4, n. 10, p. 13, pl. 1, f. 6 (1904).
10. *E. minuta*, Borg, ibidem, p. 14, pl. 1, f. 4 (1904). — Cameroons.
11. *E. stipata*, Walker, Cat. Blatt. Brit Mus. p. 208 (1868). — Sierra Leone.
12. *E. conspicua*, Walker, ibidem, p. 67 (1868). — Lake N'gami.
13. *E. hybrida*, Saussure, Rev. Suisse Zool. Vol. 3, p. 358 (1895). — Lake N'gami.
14. *E. punctipennis*, Saussure, ibidem, p. 356, pl. 9, f. 12 (1895). — Zanzibar.
15. *E. angulata*, Saussure, Soc. Ent. Zurich, Vol. 6, p. 25 (1891). — Madagascar.
   E. angulata, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 58 pl. 2, f. 21 (1895).
16. *E. trilobata*, Saussure, Soc. Ent. Zurich, Vol. 6, p. 25 (1891). — Madagascar.
   E. trilobata, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 60, pl. 2, f. 24 (1895).
17. *E. punctulata*, Saussure, Soc. Ent. Zurich, Vol. 6, p. 25 (1891). — Madagascar.
   E. punctulata, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 63, pl. 2, f. 22, 23 (1895).
18. *E. malagassa*, Saussure & Zehntner, ibidem, p. 65, pl. 2, f. 25 (1895). — Madagascar.
19. *E. cincta*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 172 (1865). — Africa (?).

Oriental species :

20. *E. lurida*, Burmeister, Handb. Ent. Vol. 2, p. 505 (1838). — India, Java, Borneo, Celebes.
   Blatta cribricollis, Serville, Hist. Nat. Ins. Orth. p. 93 (1839).
21. *E. sculpturata*, Bolivar, Ann. Soc. Ent. Fr. p. 297, pl. 10, f. 8 (1897). — Trichinopoly.
22. *E. lineaticollis*, Bolivar, ibidem, p. 298 (1897). — Trichinopoly.
23. *E. punctata*, Brunner von Wattenwyl Nouv. Syst. des Blatt. p. 173 (1865). — Ceylon.
24. *E. subsparsa*, Walker, Cat. Blatt. Brit. Mus. p. 205 (1868). — Ceylon.
25. *E. excelsa*, Navás, Bol. Soc. Aragon, Vol. 3, p. 131 (1904). — Himalayas.
26. *E. imitans*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 29, pl. 1, f. 10 (1893). — Tenasserim.
27. *E. marmorata*, Brunner von Wattenwyl, ibidem, p. 29 (1893). — Burma.
28. *E. annandalei*, Shelford, Rec. Indian Mus. Vol. 3, p. 127 (1909). — Lower Burma.
29. *E. olivacea*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 267 (1869). — Cochin China, Tonkin.
   E. immaculata, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 279 (1903).
30. *E. monticola*, Kirby, ibidem, p. 277 (1903). — Tonkin.
31. *E. pallida*, Kirby, ibidem, p. 278 (1903). — Tonkin.
32. *E. trongana*, Rehn, Proc. U. S. Nat. Mus. Vol. 27, p. 548 (1904). — Lower Siam.
33. *E. moloch*, Rehn, ibidem, p. 550 (1904). — Lower Siam.

34. *E. saussurei*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 277 (1903). China.
E. puncticollis, Saussure, Rev. Suisse Zool. Vol. 3, p. 359 (1895).
35. *E. alligata*, Walker, Cat. Blatt. Brit. Mus. p. 71 (1868). Hong Kong.
E. munda, Walker, ibidem, p. 203 (1868).
E. isochroma, Walker, ibidem, p. 204 (1868).
36. *E. sinensis*, Walker, ibidem, p. 197 (1868). Hong Kong.
37. *E. inconspicua*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 186 (1865). Philippines.
38. *E. insueta*, Walker, Cat. Blatt. Brit. Mus. p. 202 (1868). Philippines.
39. *E. pandens*, Walker, ibidem, p. 204 (1868). Philippines.
40. *E. curta*, Walker, ibidem, p. 205 (1868). Philippines.
41. *E. pustulata*, Walker, ibidem, p. 206 (1868). Philippines.
42. *E. manillensis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 268 (1869). Philippines.
43. *E. cribellata*, Stål, Oefv. Vet.-Akad. Förh. Vol. 34, n° 10, p. 34 (1877). Philippines.
44. *E. rustica*, Stål, ibidem, p. 34 (1877). Philippines.
E. mutica, Kirby, Syn. Cat. Orth. Vol. 1, p. 121 (1904).
45. *E plebeia*, Stål, Oefv. Vet.-Akad. Förh. Vol. 34, n° 10, p. 34 (1877). Philippines.
46. *E. cyrtophthalma*, Stål, ibidem, p. 35 (1877). Philippines.
47. *E. tagalica*, Stål, ibidem, p. 35 (1877). Philippines.
E. trivialis, Stål, ibidem, p. 35 (1877).
E. caliginosa, Stal, ibidem, p. 35 (1877).
48. *E. lugubrina*, Stål, ibidem, p. 35 (1877). Philippines.
49. *E. meticulosa*, Stal, ibidem, p. 35 (1877). Philippines.
50. *E. ferruginosa*, Stål, ibidem, p. 35 (1877). Philippines.
51. *E. staeli*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 277 (1903). Philippines.
E. puncticollis, Stål, Oefv. Vet.-Akad. Forh. Vol. 34, n° 10 p. 34 (1877).
52. *E. inclarata*, Walker, Cat. Blatt. Brit. Mus. p. 198 (1868). Borneo.
53. *E. quadrinotata*, Walker, ibidem, p. 209 (1868). Borneo.
54. *E. puncticollis*, Walker, ibidem, p. 74 (1868). Borneo.
55. *E. varia*, Walker, ibidem, Suppl. p. 130 (1869). Borneo.
E. varia, Shelford, Trans. Ent. Soc. Lond. p. 500, pl. 30, f. 9 (1906).
56. *E. geminata*, Brunner von Wattenwyl, Abh. Senckenb. Ges. Frankf. Vol. 24, p. 208 (1898). Borneo.
57. *E. saravacensis*, Shelford, Trans. Ent. Soc. Lond. p. 268 (1906). Borneo.
58. *E. goliath*, Shelford, ibidem, p. 269 (1906). — **Pl. 2, Fig. 6.** Borneo.
59. *E. flavomarginata*, Shelford, ibidem, p. 269 (1906). Borneo.
60. *E. ridleyi*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 278 (1903) Singapore.
61. *E. albina*, Saussure, Rev. Suisse Zool. Vol. 3, p. 351 (1895). Java.
62. *E. laevicollis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 129, pl. 10, f. 45 (1873). Java.
63. *E. deflexa*, Saussure, ibidem, p. 126, pl. 10, f. 43 (1873). Java.
64. *E. plena*, Walker, Cat. Blatt. Brit. Mus. p. 210 (1868). Borneo, Celebes, Papua.
E. fervida, Walker, ibidem, p. 211 (1868).

Australasian species :

65. *E. doleschali*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 194 (1865). Amboina.
66. *E. keraudrenii*, Le Guillou, Rev. Zool. p. 292 (1841). New Guinea.
67. *E. papua*, Saussure, Rev. Suisse Zool. Vol. 3, p. 361, pl. 9, f. 14 (1895). New Guinea.
68. *E. dilatata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 185 (1865). Australia.
69. *E. laticollis*, Walker, Cat. Blatt. Brit. Mus. p. 203 (1868). Australia.
70. *E. pectinata*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, vol. 20, p. 271 (1869). Australia.
71. *E. perplexa*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 156 (1895). Victoria

American species :

72. *E. crassa*, Saussure, Rev. Zool. (2), Vol. 16, p. 99 (1864). — Mexico.
E. crassa, Saussure & Zehntner, Biol. Centr.-Amer. Orth. Vol. 1, p. 62, pl. 4, f. 37 (1893).
73. *E. azteca*, Saussure, Rev. Zool. (2), Vol. 20, p. 356 (1868). — Mexico, Ecuador.
E. azteca, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 95 (1893).
74. *E. mexicana*, Saussure, Rev. Zool. (2), Vol. 14, p. 228 (1862). — Mexico, Guatemala, Ecuador.
E. mexicana, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 63 (1893).
75. *E. maya*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 3 (1903). — Nicaragua.
76. *E. sodalis*, Walker, Cat. Blatt. Brit. Mus. p. 72 (1868). — Guatemala, Guiana, Santarem.
E. conspersa, Saussure & Zehntner, Biol. Centr.-Amer. Orth. Vol. 1, p. 64, pl. 4, f. 38 (1893).
77. *E. fusca*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 170 (1865). — Venezuela.
78. *E. arctata*, Walker, Cat. Blatt. Brit. Mus. p. 74 (1868). — British Guiana.
79. *E. substrigata*, Walker, ibidem, p. 73 (1868). — British Guiana.
E. opaca, Walker, ibidem, p. 206 (1868).
80. *E. lucifuga*, Rehn, Trans. Amer. Ent. Soc. Vol. 29, p. 271 (1903). — British Guiana.
81. *E. abortivipenna*, Rehn, ibidem, p. 273 (1903). — British Guiana.
82. *E. grisea*, De Geer, Mém. Ins. Vol. 3, p. 570, pl. 44, f. 9 (1773). — Surinam, Brazil.
E. cinerea, Thunberg, Mém. Acad. Sc. St-Pétersb. p. 277 (1826).
E. maculicollis, Serville, Hist. Nat. Ins. Orth. p. 92 (1839).
E. brasiliensis, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 169 (1865).
83. *E. columbiana*, Saussure, Rev. Suisse Zool. Vol. 3, p. 360, pl. 9, f. 13 (1895). — New Granada.
84. *E. stigmosa*, Giglio-Tos, Boll. Mus. Zool. Anat. Torino, Vol. 13, nº 311, p. 8 (1898). — Ecuador.
85. *E. josephi*, Giglio-Tos, ibidem, p. 9 (1898). — Ecuador.
86. *E. brasiliensis*, Fabricius, Syst. Ent. p. 272 (1775). — Brazil.
87. *E. conspersa*, Burmeister, Handb. Ent. Vol. 2, p. 505 (1838). — Brazil.
88. *E. cribrosa*, Burmeister, ibidem, p. 505 (1838). — Brazil.
89. *E. crossea*, Saussure, Rev. Zool. (2), Vol. 16, p. 323 (1864). — Brazil.
E. crocea, Saussure, Mém. Hist. Nat. Mexique, Blatt. p. 133 (1864).
90. *E. agathina*, Saussure, Rev. Zool. (2), Vol. 16, p. 322 (1864). — Brazil.
91. *E. heydeniana*, Saussure, ibidem, p. 323 (1864). — Brazil.
92. *E. bivittata*, Saussure, ibidem, p. 323 (1864). — Brazil.
93. *E. atriventris*, Saussure, Rev. Suisse Zool. Vol. 3, p. 357 (1895). — Brazil.
94. *E. imitatrix*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 63 (1893). — Brazil.
95. *E. fallax*, Saussure & Zehntner, ibidem, p. 64, pl. 4, f. 36 (1893). — Brazil.
96. *E. verticalis*, Burmeister, Handb. Ent. Vol. 2, p. 505 (1838). — Brazil.
E. socia, Stål, Freg. Eugen. Resa, Ins. p. 309 (1858).
E. bella, Saussure, Rev. Zool. (2), Vol. 16, p. 322 (1864).
E. melanosoma, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 266 (1869).
97. *E. maculifrons*, Stål, Freg. Eugen. Resa, Ins. p. 310 (1858). — Brazil.
98. *E. proxima*, Brunner von Wattenwyl, Nouw Syst. des Blatt. p. 176 (1865). — Brazil.
99. *E. cinerascens*, Brunner von Wattenwyl, ibidem, p. 173 (1865). — Brazil.
100. *E. castanea*, Brunner von Wattenwyl, ibidem, p. 174 (1865). — Brazil.
101. *E. testacea*, Brunner von Wattenwyl, ibidem, p. 187 (1865). — Brazil.
102. *E. ferruginea*, Brunner von Wattenwyl, ibidem, p. 187 (1865). — Brazil.
103. *E. subconspersa*, Walker, Cat. Blatt. Brit. Mus. p. 71 (1868). — Brazil.
104. *E. adjuncta*, Walker, ibidem, p. 72 (1868). — Brazil.
105. *E. repanda*, Walker, ibidem, p. 73 (1868). — Brazil.
106. *E. caliginosa*, Walker, ibidem, p. 207 (1868). — Brazil.
107. *E. conferta*, Walker, ibidem, p. 207 (1868). — **Pl. 2, Fig. 8.** — Brazil.
108. *E. basistriga*, Walker, ibidem, p. 211 (1868). — Brazil (?).

109. *E. abdomen-nigrum*, De Geer, Mém. Ins. Vol. 3, p. 538, pl. 44, f. 5 (1773). Brazil, Surinam, W. Indies.
E. livida, De Geer, ibidem, p. 538, pl. 44, f. 6 (1773).
E. brevis, Brunner von Wattenwyl, Proc. Zool. Soc. Lond. p. 203, pl. 15. f. 3 (1892). — **Pl. 2, Fig. 7.**
110. *E. caizana*, Giglio-Tos, Boll. Mus. Zool. Anat. Torino. Vol. 12, nº 302, p. 10 (1897). Bolivia.
111. *E. limbalis*, Brancsik, Verh. Ver. Trencsin. Com. Vol. 23-24, p. 187 (1901). Paraguay.
112. *E. latifrons*, Saussure & Zehntner, Biol.-Centr. Amer. Orth. Vol. 1, p. 66 (1893). « S. America. »
113. *E. burmeisteri*, Guérin, in Ramon de la Sagra, Hist. Cuba, Ins. p. 345 (1857). Cuba.
E. burmeisteri, Saussure, Mém. Mexique, Blatt. p. 131, pl. 2, f. 25 (1864).
114. *E. insularis*, Bolivar, Mém. Soc. Zool. Fr. Vol. 1, p. 128 (1888). Cuba.
115. *E. cubensis*, Bolivar, ibidem, p. 127 (1888). Cuba.
116. *E. caraibea*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 65 (1893). Cuba.
117. *E. sabulosa*, Walker, Cat. Blatt. Brit. Mus. p. 70 (1868). Haiti.
118. *E. microspila*, Walker, ibidem, p. 208 (1868). Haiti.

Doubtful species :

119. *E. elegans*, Eschscholtz, Entomographien, p. 84 (1822). Philippines.
120. *E. acutipennis*, Serville, Hist. Nat. Ins. Orth. p. (1839). Habitat (?).

23. Genus EUSTEGASTA, Gerstäcker

Eustegasta. Gerstäcker, Mitt. Ver. Vorpomm. Vol. 14, p. 53 (1883).
Compsoblatta. Saussure, Soc. Ent. Zurich, Vol. 6, p. 9 (1891).

Characters. — Size small. Head with the vertex freely exposed. Pronotum nitid, impunctate, posteriorly produced triangularly, sides deflexed. Tegmina and wings fully developed in both sexes, the former seriate-punctate at base; mediastinal vein of wings very long and giving off many rami to anterior margin. Supra-anal lamina (♂) surpassed by the sub-genital lamina which is asymmetrical and with two styles, in the ♀ the supra-anal lamina is variable but usually of the typical Epilamprine shape. Femora most sparsely armed with one or two spines only on the margins beneath. Tarsi very long, metatarsi biseriately spined beneath, pulvilli apical, second and third tarsal joints with a few spines.

Geographical distribution of species. — East and West Africa, Madagascar.

1. *E. poecila*, Schaum, Ber. Akad. Wiss. Berlin, p. 777 (1853). Mozambique, Nyasaland.
E. poecila, Schaum, Peters' Reise Mossamb. Zool. Vol. 5, p. 109, pl. 7, f. 2 (1862).
2. *E. obsoleta*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 5, p. 287 (1900). Nyasaland.
3. *E. micans*, Saussure & Zehntner, Rev. Suisse Zool. Vol. 3, p. 17 (1895). Zanzibar.
4. *E. buprestoides*, Walker, Cat. Blatt. Brit. Mus. p. 76 (1868). — **Pl. 2, Fig. 9.** Fernando Po, Cameroons.
5. *E. carabidina*, Walker, ibidem, p. 76 (1868). Sierra Leone.
6. *E. lucci*, Dominique, Bull. Soc. Ouest France, Vol. 10, p. 204, pl. 3, f. 14-18 (1900). French Congo.
7. *E. agrilidina*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 47 (1907). French Congo.
8. *E. variegata*, Shelford, ibidem, p. 47 (1907). French Congo.
9. *E. splendens*, Saussure, Abh. Senckenb. Ges. Frankf. Vol. 21, p. 584 (1899). West Africa (?).
10. *E. metallica*, Saussure, Soc. Ent. Zurich, Vol 6, p. 26 (1891). Madagascar.
E. metallica, Saussure & Zehntner, in Grandidier, Hist. Nat. Madag. Orth. Vol. 1, p. 108, pl. 3, f. 37 (1895).

11. *E. amoena*, Saussure, Rev. Zool. (2), Vol. 16, p. 343 (1864). Madagascar.
E. amoena, Saussure & Zehntner, ibidem, p. 102, pl. 3, f. 36 (1895).
12. *E. venusta*, Saussure, Soc. Ent. Zurich, Vol. 6, p. 10 (1891). Madagascar.
13. *E. suava*, Saussure, ibidem, p. 26 (1891). Madagascar.
14. *E. pulchella*, Saussure, ibidem, p. 10 (1891). Madagascar.
E. pulchella, Saussure & Zehntner, ibidem, p. 106, pl. 3, f. 38 (1895).
15. *E. lepida*, Saussure & Zehntner, Rev. Suisse Zool. Vol. 3, p. 16 (1895). Madagascar.
16. *E. blanda*, Saussure & Zehntner, ibidem, p. 16 (1895). Madagascar.

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EXPLANATION OF THE PLATES

Plate 1

Fig. 1. *Phoraspis convexa*, Thunberg.
— 1*a*. — — — Posterior tarsus.
2. *Notolampra gibba*, Thunberg. Wing of male.
— 3. *Phlebonotus pallens*, Serville. Wing of male.
— 4. — — — Wing of female.
— 5. *Apsidopis oxyptera*, Walker.
— 6. *Compsolampra liturata*, Serville.
— 7. *Morphna maculata*, Brunner von Wattenwyl.
— 7*a*. — — — — Posterior tarsus.
— 8. *Molytria inquinata*, Stâl. Male.
— 9. *Homalopteryx maindroni*, nov. sp.
— 10. — *basifera*, Walker. Posterior tarsus.
— 11. *Ataxigamia bicolor*, nov. sp.

Plate 2

Fig. 1. *Rhicnoda natatrix*, Shelford. Female.
— 2. *Aüdreia pulchra*, nov. gen. et sp. Female.
— 2*a*. — — — — Male.
— 3. *Pseudophoraspis fruhstorferi*, nov. sp.
— 4. — *nebulosa*, Burmeister. Posterior tarsus.
— 5. *Rhabdoblatta praecipua*, Walker.
— 5*a*. — — — Posterior tarsus.
— 6. *Epilampra goliath*, Shelford.
— 7. — *brevis*, Brunner von Wattenwyl. Posterior tarsus.
— 8. — *conferta*, Walker.
— 9. *Eustegasta buprestoides*, Walker.

Oxford, 15th December 1909.

Phoraspis convexa

Apsidopis oxyptera

Compsolampra liturata

Phoraspis picta

Phlebonotus pallens

Morphna maculata

Notolampra gibba

10

Morphna maculata

Molytria inquinata

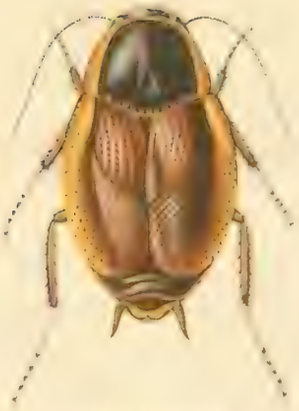
Homalopteryx maindroni

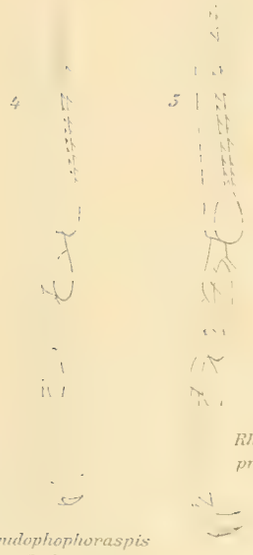
FAM. BLATTIDÆ

SUBFAM. EPILAMPRINÆ

Audreia pulchra ♀

Rhicnoda natatrix





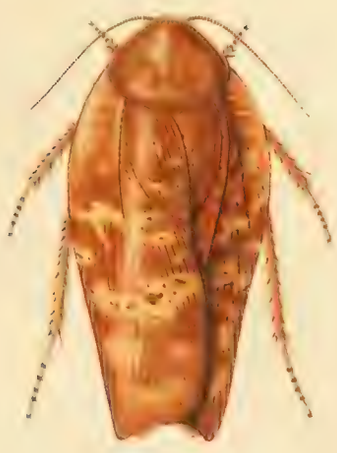
Pseudophophoraspis achulosa.

Rhabdoblatta praecipua.

Epilampra goliath.

Pseudophoraspis fruhstorferi

Epilampra brevis



Rhabdoblatta praecipua

Epilampra conferta

FAM. BLATTIDÆ

SUBFAM. EPILAMPRINÆ

109me FASCICULE ORTHOPTERA

GENERA INSECTORUM

DIRIGÉS PAR

P. WYTSMAN

ORTHOPTERA

FAM. BLATTIDÆ

SUBFAM. BLATTINÆ (= PERIPLANETINÆ)

by R. SHELFORD

WITH 2 COLOURED PLATES

1910

PRIX : FR. 10.80

On souscrit chez M. P. WYTSMAN, Zoologiste, Quatre-Bras, TERVUEREN (Belgique).
Prospectus gratis et franco sur demande.

ORTHOPTERA

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The Blattinæ (Periplanetinæ) form the fourth subfamily of the Blattidæ.

Characters. — Antennæ setaceous and usually much longer than the body, very rarely plumose or incrassated. Head with the vertex usually exposed. Eyes reniform. Ocelliform spots rarely absent. Tegmina and wings completely developed, reduced, rudimentary or absent; when present usually semicoriaceous; the costal veins of the wings irregular and much branched, ulnar vein of the wings multiramose, the branches irregular and bifurcated. Sub-genital lamina of male typically quadrate and symmetrical with a pair of slender genital styles. Sub-genital lamina of female modified to form a pair of apposed valves. Cerci variable, but generally flattened and acuminate. Femora generally strongly spined beneath. Tarsi variable. Ootheca chitinous, carried with the suture uppermost. None of the species viviparous.

This is a very well-defined subfamily on account of the valvular structure of the female sub-genital lamina, whilst the males can also be readily distinguished by the symmetry of the sub-genital lamina and by the slender but well-marked styles. I have met with no forms that can be regarded as intermediate between this and other subfamilies of Blattidæ. I cannot follow Bolivar in maintaining the subfamily *Nocticolinae* for the cavernicolous genera *Nocticola* and *Spelaeoblatta;* to my mind the undoubted Blattine features of the female sub-genital lamina in these genera over-ride in importance characters that have been called into existence by the cave-haunting habit. Sexual dimorphism is a very marked feature of the Blattinæ and some confusion has resulted from its non-recognition by some authors; there is no doubt that the number of known species of *Deropeltis* and *Pseudoderopeltis* will be reduced when we gain more exact knowledge of the two sexes of both genera; several species of *Pseudoderopeltis*, described from females alone, have been placed in *Stylopyga* by older authors, so that the synonymy is somewhat

tangled. I have separated *Stylopyga* from the genus *Blatta* for what I consider a valid reason, viz. the similarity of the two sexes in the former genus, their dissimilarity in the latter. But I am far from satisfied that the species now included in *Blatta* form a natural group and I am only restrained from further depleting the genus by lack of knowledge concerning the structure of the two sexes in certain species; when this knowledge comes to hand — as eventually will surely be the case — the genus can be re-arranged satisfactorily.

KEY TO THE GENERA

1. *Eyes well-developed. Tarsal arolia present.*
2. *Posterior margin of fifth abdominal tergite not sinuate.*
3. *Tibiae with spines on outer aspect triseriately arranged.*
4. *Posterior metatarsus shorter or not longer than the remaining joints, which are unarmed beneath.*
5. *Distance apart of eyes on vertex of head less than or equal to the distance apart of the antennal sockets. Old-World forms.*
6. *Ocelli usually absent. Tegminal rudiments absent. Abdominal tergites with well-marked stigmatic dots. Supra-anal lamina (♀) more or less bilobate. Cerci blunt and flattened, generally not extending beyond the supra-anal lamina . . .* — 2. Genus Euzosteria, Shelford.

6'. *Ocelli present. Tegmina present, rudimentary or absent. Abdominal tergites rarely with stigmatic dots. Supra-anal lamina (♀) not bilobate. Cerci longer, apex usually acuminate.*

7. *Wings absent or rudimentary. Tegmina rudimentary or absent.*
8. *Tegmina absent or represented by squamiform lobes.*
9. *Posterior angles of the fifth and sixth abdominal tergites backwardly produced.*
10. *Posterior metatarsus short, not spined beneath or with only a few spines; its pulvillus usually large, and occupying at least half of the joint.*
11. *Lateral margins of pronotum not incrassated. Thoracic tergites more or less smooth and nitid.*
12. *Supra-anal lamina (♂) not produced to form an acute spine . . . . . .* — 3. Genus Platyzosteria, Brunner von [Wattenwyl.

12'. *Supra-anal lamina (♂) produced to form an acute spine . . . . . .* — 4. Genus Leptozosteria, Tepper.

11. *Lateral margins of pronotum incrassated. Thoracic tergites punctate or tuberculate . . . . . .* — 6. Genus Zoniopoca, Stål.

10'. *Posterior metatarsus longer, spined beneath, its pulvillus not occupying one-half of the joint . . . .* — 5. Genus Cutilia, Stål.

9'. *Posterior angles of the fifth and sixth abdominal tergites not backwardly produced, or if produced the abdominal tergites are scabrous. Tegmina entirely absent.*

10. *Posterior angles of seventh abdominal tergite backwardly produced; abdomen above scabrous* . . . . . 7. Genus Cosmozosteria, Stål.

10'. *Posterior angles of seventh abdominal tergite not backwardly produced; abdomen above smooth, nitid.*

11. *Lateral margins of pronotum not incrassated* . . . 8. Genus Anamesia, Tepper.

11'. *Lateral margins of pronotum incrassated* . . . . 9. Genus Desmozosteria, Shelford.

8'. *Tegmina quadrate, as long as the pronotum.*

9. *Wings absent* . . . . . 10. Genus Temnelytra, Tepper.

9'. *Wings rudimentary* . . . . . 11. Genus Scabina, Shelford.

7'. *Tegmina and wings well-developed.*

8. *Antennae not plumose nor incrassated.*

9. *Pronotum anteriorly parabolic, sides deflexed* . . . . 12. Genus Methana, Stål.

9'. *Pronotum discoidal, sides not deflexed* . . . . . 13. Genus Paramethana, Shelford.

8'. *Antennae plumose and incrassated* . . . . . 14. Genus Thyrsocera, Burmeister.

5'. *Distance apart of eyes on vertex of head greater than distance apart of antennal sockets. American forms.*

6. *Tegmina squamiform or much reduced, quadrate and not extending beyond the metanotum. Wings absent or squamiform* . . . . . 15. Genus Eurycotis, Stål.

6'. *Tegmina and wings completely developed or ovate and extending to the middle of the abdomen* . . . . . 16. Genus Pelmatosilpha, Dohrn.

4'. *Posterior metatarsus longer than the remaining joints, the second and generally the third of which are armed beneath.*

5. *Pronotum trapezoidal or discoidal.*

6. *Both sexes apterous or with squamiform tegmina* . . . . 18. Genus Stylopyga, Fischer von [Waldheim.

6'. *Male sex only or both sexes with well-developed tegmina.*

7. *Second joint of posterior tarsi long, together with the third and fourth joints biseriately spined beneath. Pulvilli minute.*

8. *Tegmina of ♂ variable, but always shorter than the abdomen, of ♀ squamiform or truncate or lanceolate* . . 19. Genus Blatta, Linnæus.

8'. *Tegmina of ♂ well-developed, exceeding apex of abdomen.*

9. *Tegmina of ♀ sub-truncate or squamiform.*

10. *Tegmina of ♀ sub-truncate. Meso- and metanotum of ♂ without membranous processes* . . . . . 20. Genus Cartoblatta, Shelford.

10'. *Tegmina of ♀ squamiform. Meso- and metanotum of ♂ with membranous processes* . . . . . 21. Genus Pseudoderopeltis, Krauss.

9'. *Tegmina of ♀ fully developed, exceeding the apex of the abdomen.*

10. *Pronotum broadest behind middle, its sides deflexed* . 22. Genus Periplaneta, Burmeister.

10'. *Pronotum broadest before middle, discoidal* . . . . 23. Genus Homalosilpha, Stål.

7'. *Second joint of posterior tarsi short, fourth joint unarmed beneath. Pulvilli moderately large* . . . . . 17. Genus Dorylæa, Stål.

5'. *Pronotum oblong* . . . . . 24. Genus Eroblatta, Shelford.

3'. *Tibiae with spines on outer aspect biseriately arranged.*

4. *Tibial spines well- or moderately well-developed.*
5. *Tarsi very short. Entirely apterous* . . . . . 1. Genus Polyzosteria, Burmeister.
5'. *Tarsi long. Winged* . . . . . 26. Genus Mikoleaia, Shelford.
4'. *Tibial spines weak and sparse.*
5. *Pronotum very rugose, discoidal* (♂) *or trapezoidal* (♀) . . 27. Genus Catara, Walker.
5'. *Pronotum not very rugose, oblong.*
6. *Posterior metatarsus longer than the remaining joints.* . . 28. Genus Protagonista, Shelford.
6'. *Posterior metatarsus shorter than the remaining joints* . . 29. Genus Archiblatta, Vollenhoven.
2'. *Posterior margin of fifth abdominal tergite sinuate* . . . . . 25. Genus Deropeltis, Burmeister.
1'. *Eyes rudimentary or absent. Tarsal arolia absent.*
2. *Eyes rudimentary. Head cordiform* . . . . . 30. Genus Nocticola, Bolivar.
2'. *Eyes absent. Head oblong* . . . . . 31. Genus Spelæoblatta, Bolivar.

1. Genus POLYZOSTERIA, Burmeister

Polyzosteria. Burmeister, Handb Ent., Vol. 2, p. 482 (1838).
Chalcolampra. Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 132 (1863).

Characters. — Ocelli absent. Antennæ shorter than the body. Pronotum anteriorly somewhat cucullate, margins not reflected, posteriorly truncate. Tegmina and wings entirely absent. Posterior angles of the seventh abdominal tergite strongly produced backwards, angles of the preceding tergites not or scarcely produced, angles of the ninth tergite sometimes lobiform. Stigmatic dots on abdominal tergites well-marked. Supra-anal lamina : (♂) quadrate, angles acute, (♀) sub-bilobate cucullate. Sub-genital-lamina (♂) sub-quadrate, styles short, obtuse. Cerci short, flattened, blunt at apex. Tibiæ robust, almost quadrangular in section, spines on outer aspect in two rows. Posterior metatarsus very short, unarmed beneath, its pulvillus occupying the greater part of the joint.

Geographical distribution of species. — Australia and Tasmania.

1. *P. limbata*, Burmeister, Handb. Ent., Vol. 2, p. 483 (1838). — Australia, Tasmania.
P. aenea, Burmeister, ibidem, p. 483 (1838).
P. purpurascens, Fischer, Orth. Eur. p. 93 (1853).
P. pulchella, Saussure, Rev. Zool. (2) Vol. 16, p. 308 (1864).
P. nitens, Walker, Cat. Blatt. Brit Mus. p. 155 (1868).
? *P. frenchii*, Tepper, Trans. Roy. Soc. S. Austral. Vol. 18, p. 178 (1894).
2. *P. iridicolor*, Tepper, ibidem, Vol. 17, p. 73 (1893). — South Australia.
3. *P. bagoti*, Tepper, ibidem, p. 79 (1893). — South Australia.
4. *P. cuprea*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 133, pl. 1, f. 2. — **Pl. I, Fig. 1.** — South and West Australia.
P. maculata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 206 (1865).
5. *P. impressa*, Tepper, *in* Horn, Exped. Centr. Austral., Vol 2, p. 361 (1896). — Central Australia.
6. *P. obscuroviridis*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 73 (1893). — South Australia.
7. *P. pubescens*, Tepper, ibidem, p. 75 (1893). — **Pl. I, Fig. 1a.** — West Australia.
8. *P. oculata*, Tepper, ibidem, p. 75 (1893). — South Australia, Victoria.
9. *P. invisa*, Walker, Cat Blatt. Brit. Mus. p. 162 (1868). — Australia.
10. *P. viridissima*, Shelford, Trans. Ent. Soc. Lond. p. 262 (1909). — New South Wales.

2. Genus EUZOSTERIA, Shelford

Euzosteria. Shelford, Trans. Ent. Soc. Lond. p. 262 (1909).

Characters. — Similar to *Polyzosteria*, but the spines on outer aspect of tibiæ triseriately arranged. Margins of pronotum more or less reflected. Ocelli occasionally present. Supra-anal lamina : (♂) with less acute angles, (♀) more rounded, less bilobate.

Geographical distribution of species. — Australia.

1. *E. subverrucosa*, White, *in* Grey, Journ. Exped. Austral., Vol. 2, p. 467 (1841). — Australia.
   Polyzosteria reflexa, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 208 (1865).
   Polyzosteria femoralis, Walker, Cat. Blatt. Brit. Mus. p. 156 (1868).
   Polyzosteria figurata, Walker, ibidem, p. 157 (1868).
2. *E. subreflexa*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 19, p. 158 (1895). — South Australia.
3. *E. nobilis*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 209 (1865). — South and West Australia.
   Polyzosteria subnobilis, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 81 (1893).
4. *E. patula*, Walker, Cat. Blatt. Brit. Mus. p. 157 (1868). — Pl. 1, Fig. 2a. — South and West Australia.
5. *E. mitchellii*, Angas, S. Austral. Illustr., pl. 48, f. 1 (1847). — Pl. 1, Fig. 2. — Victoria, South and West Australia.
   E. mitchellii, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 109 (1873).

3. Genus PLATYZOSTERIA, Brunner von Wattenwyl

Platyzosteria. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 204 (1868).
Melanozosteria. Stål, Bih. Svensk. Akad., Vol. 2, nº 13, p. 13 (1874).
Syntomaptera. Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 106 (1893).
Drymaplaneta. Tepper, ibidem, p. 109 (1893).

Characters. — Ocelli absent. Antennæ shorter than the body. Body depressed. Vertex of head not covered by pronotum. Pronotum not cucullate, its margins not reflected. Rudiments of tegmina present as squamiform lobes or absent. Wings absent. Posterior angles of all the abdominal tergites produced, those of the distal tergites strongly produced and spiniform. Supra-anal lamina variable in shape, but never sub-bilobate in ♀. Genital styles long, slender, acuminate. Cerci frequently exceeding the supra-anal lamina, apex acuminate. Tibiæ moderately spined, spines on outer aspect triseriately arranged. Posterior metatarsus very short, not spined beneath or with only a few spines, its pulvillus covering the greater part of the joint beneath.

Geographical distribution of species. — Formosa, Malay Archipelago to Australia, Tasmania, New Zealand, Bombay.

1. *P. grandis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 110 (1873). — Victoria, South Australia.
2. *P. melanaria*, Erichson, Arch. f. Naturg., Vol. 8, p. 247 (1842). — Pl. 1, Fig. 3c. — Tasmania.
3. *P. analis*, Saussure, Rev. Zool. (2), Vol. 16, p. 306 (1864). — New South Wales, West Australia, Bombay.
   Polyzosteria melanaria, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 210 (1865).

Periplaneta invisa, Walker, Cat. Blatt. Brit. Mus. p. 137 (1868) (♂ only).
Periplaneta ruficornis, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 38 (1871).

4. *P. pseudatrata*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 86 (1893). Central Australia.
5. *P. aterrima*, Erichson, Arch. f. Naturg., Vol. 8, p. 248 (1842). Tasmania, Australia.
Periplaneta glabra, Tepper, Trans. Roy. Soc. S. Austral. Vol. 17, p. 107 (1893).
Syntomaptera tepperi, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 374 (1903).
6. *P. ferox*, Shelford, Trans. Ent. Soc. Lond. p. 273, pl. 7, f 7 (1909). — Pl. 1, Fig. 3a. Central Australia.
7. *P. armata*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 84 (1893). West Australia.
8. *P. rufofusca*, Tepper, ibidem, p. 84 (1893). South Australia.
9. *P. bifida*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 110, pl. 10, f. 37 (1873). Queensland.
10. *P. atrata*, Erichson, Arch. f. Naturg , Vol. 8, p. 248 (1842). Tasmania, New S. Wales, Victoria, West Australia.
11. *P. invisa*, Walker, Cat. Blatt. Brit. Mus. p. 137 (1868). New S. Wales, West Australia.
12. *P. consobrina*, Saussure, Rev. Zool. (2), Vol. 16, p. 306 (1864). Australia.
13. *P. ruficeps*, Shelford, Blattidæ, in Fauna Südwest Austral. Vol. 2, Lief. 9, p. 134, pl. 13, f. 3 (1909). West Australia.
14. *P. punctata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 211 (1865). New S. Wales.
15. *P. variolosa*, Bolivar, Ann. Soc. Ent. Fr. (6), Vol. 2, p. 460 (1882). New Caledonia.
16. *P. scabra*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 213 (1865). New S. Wales.
Polyzosteria scabra, Walker, Cat. Blatt. Brit. Mus. p. 162 (1868).
17. *P. coxalis*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 35 (1871). Bombay.
18. *P. scabrella*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 88 (1893). South Australia, New S. Wales.
19. *P. biglumis*, Saussure, Rev. Zool. (2), Vol. 16, p. 305 (1864). New S. Wales, Victoria, S. Australia.
P. subaptera, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 212 (1865).
20. *P. perplexa*, Shelford, Trans. Ent. Soc. Lond. p. 277 (1909). Tasmania.
21. *P. rufipes*, Shelford, ibidem, p. 278 (1909). West Australia.
22. *P. biloba*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 258 pl. 3, f. 20 (1869). Amboina.
23. *P. curiosa*, Shelford, Blattidæ, in Fauna Südwest Austral. Vol. 2, Lief. 9, p. 135, pl. 13, ff 11, 12 (1909). West Australia.
24. *P. bicolor*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 373 (1903). — Pl. 1, Fig. 3. Torres Straits.
25. *P. novae-seelandiae*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 218 (1865). New Zealand.
Periplaneta fortipes, Walker, Cat. Blatt. Brit. Mus. p. 137 (1868).
26. *P. castanea*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 214 (1865). New S. Wales, Victoria.
P. avocaensis, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 88 (1893).
P. exaspera, Tepper, ibidem, Vol. 18, p. 182 (1894).
27. *P. obscura*, Tepper, ibidem, Vol. 17, p. 107 (1893). South and West Australia.
28. *P. scabriuscula*, Tepper, ibidem, p. 108 (1893). South and West Australia.
29. *P. rufoterminata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 219 (1865). Australia.
30. *P. pseudocastanea*, Tepper, Trans. Roy. Soc. S. Austral , Vol. 17, p. 89 (1893). South Australia.
31. *P. ceratodi*, Krauss, Denkschr. Med.-nat. Ges. Jena, Vol. 8, p. 751 (1903) Queensland.
32. *P. glabra*, Walker, Cat. Blatt. Brit. Mus. p. 139 (1868). Australia.
33. *P. conjuncta*, Shelford, Blattidæ, in Fauna Südwest Austral. Vol. 2, Lief. 9, p. 136 (1909). West Australia.
34. *P. morosa*, Shelford, ibidem, p. 136 (1909). South and West Australia.
35. *P. provisionalis*, Tepper, Trans. Roy. Soc. S. Austral., Vol 17, p. 108 (1893). South Australia.
36. *P. inclusa*, Walker, Cat. Blatt. Brit. Mus. p. 140 (1868). West Australia.

37. *P. albomarginata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 212 (1865). — New S. Wales, West Australia.
38. *P. brunnea*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 86 (1893). — South Australia, Central [Australia.
39. *P. obscuripes*, Tepper, ibidem, p. 112 (1893). — South and West Australia.
40. *P. variegata*, Shelford, Blattidæ, in Fauna Südwest Austral., Vol. 2. Lief. 9, p. 137, pl. 13. f. 14 (1909). — West Australia.
41. *P. spenceri*, Shelford, Trans. Ent. Soc. Lond. p. 284 (1909). — Central Australia.
42. *P. soror*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 219 (1865). — Formosa, Borneo, Austro-Malayan, Melanesian and Polynesian Islands.
P. semicincta, Walker, Cat. Blatt. Brit. Mus. p. 140 (1868).
43. *P. communis*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 110 (1893). — Australia.
Methana antipodum, Brancsik, Jahresh. Ver. Trencsin. Comit., Vol. 19-20, p. 58, pl. 1, f. 4 (1897)
44. *P. semivitta*, Walker, Cat. Blatt. Brit. Mus. p. 143 (1868). — **Pl. 1, Fig. 3d.** — South and West Australia.
P. semivitta, Shelford, Trans. Ent. Soc. Lond. p. 285. pl. 8, f. 26*a*-26*f* (1909).
45. *P. subbifasciata*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 112 (1893). — South Australia.
46. *P. liturata*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 108, pl. 10, f. 36 (1873) — New Georgia.
47. *P. circumducta*, Walker, Cat. Blatt. Brit Mus. p. 143 (1868). — South Australia.
Drymaplaneta submarginata, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17. p. 111 (1893).
48. *P. sex-guttata*, Walker, Cat. Blatt. Brit. Mus. p. 141 (1868). — Australia.
49. *P. balteata*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 91 (1893). — South Australia.
50. *P. latizona*, Tepper, ibidem, p. 92 (1893). — South Australia.
51. *P. coolgardiensis*, Tepper, ibidem, Vol. 19, p. 159 (1895). — **Pl. 1, Fig. 3b.** — West Australia.
52. *P. aposematica*, Shelford, Trans. Ent. Soc. Lond. p. 288. pl. 9, f. 29 (1909). — Central Australia.
53. *P. hartmeyeri*, Shelford, Blattidæ, in Fauna Südwest Austral., Vol. 2, Lief. 9, p 138 (1909). — West Australia.

Doubtful species :

54. *P. zebra*, Tepper, *in* Horn, Exped Centr. Austral., Vol. 2, p. 362 (1896). — Central Australia.
55. *P. jungii*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 19, p. 162 (1895). — Yorketown.
56. *P. parva*, Tepper, ibidem, p. 162 (1895). — New S. Wales.

4. Genus LEPTOZOSTERIA, Tepper

Leptozosteria. Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 96 (1893).

Characters. — Body very flat and thin, elongate. Integument soft. Supra-anal lamina of male triangular, terminating in an acute apical spine. Colour pale with dark bands.

Geographical distribution of species. — Central Australia.

1. *L. prima*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 96 (1893).

5. Genus CUTILIA, Stål

Cutilia. Stål, Oefv. Vet.-Akad. Förh., Vol. 34, nº 10, p. 36 (1877).

Characters. — Closely allied to *Platyzosteria* Brunner von Wattenwyl, but the posterior metatarsus long and biseriately spined beneath, its pulvillus apical; remaining tarsal joints unarmed beneath,

their pulvilli occupying the entire joints. Tegminal rudiments present. In all but one species the posterior angles of the distal abdominal tergites strongly produced backwards. Supra-anal lamina (♂) quadrate.

Geographical distribution of species. — Formosa, Malay Archipelago, Torres Straits, Australia, New Zealand.

1. *C. nitida*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 214 (1865). — Formosa, Malay Archipelago, New S. Wales.
   Periplaneta polita, Walker, Cat Blatt. Brit. Mus. p. 139 (1868).
   Cutilia tartarea, Stål, Oefv. Vet.-Akad. Förh. Vol. 34, nº 10, p. 36 (1877).
   ? *Blatta atterima*, Eschscholtz, Entomographien, p 89 (1822).
2. *C. melanesiae*, Shelford, Trans. Ent. Soc. Lond. p. 291 (1909). — Torres Straits.
3. *C. triangulata*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 13, p. 33 (1893), footnote. — Queensland, Thursday Isl.
   C. triangulata, Krauss, Denkschr. Med.-nat. Ges. Jena, Vol. 8, p. 750, pl. 67, f. 1 (1903).
   Leptozosteria secunda, Tepper, Trans. Roy. Soc. S. Austral., Vol. 18, p. 183 (1894).
4. *C. heydeniana*, Saussure, Rev. Zool. (2), Vol. 16, p. 317 (1864). — West Australia.
   Periplaneta marginifera, Walker, Cat. Blatt. Brit. Mus. p. 144 (1868).
5. *C. sedilloti*, Bolivar, Ann. Soc. Ent. Fr. (6), Vol. 2, p. 459 (1882). — Pl. 1, Fig. 5. — New Zealand.
6. *C. brunni*, Alfken, Abhandl. Ver. Bremen, Vol. 17, p. 142 (1901). — Chatham Isl.

6. Genus ZONIOPLOCA, Stål

Zonioploca. Stål, Bih. Svensk. Akad., Vol. 2, nº 13, p. 13 (1874).
Knephasia. Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 99 (1893).

Characters. — Ocelli absent. Lateral margins of pronotum incrassated. Dorsal surface granulate, or with shallow punctures. Tegminal rudiments absent. Posterior angles of abdominal tergites 5-7 strongly produced. Supra-anal lamina : (♂) quadrate, angles obtuse, lateral margins entire, (♂) triangular, apex emarginate. Sub-genital lamina (♂) trapezoidal, styles lateral. Posterior metatarsus unarmed beneath, equal to the remaining joints in length, its pulvillus apical.

Geographical distribution of species. Australia.

1. *Z. medilinea*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 100 (1893). — Pl. 1, Fig. 4. — Victoria, South and West Australia.
2. *Z. alutacea*, Stål, Bih. Svensk. Akad., Vol. 2, nº 13, p. 13 (1874). — South Australia, Queensland.
   Platyzosteria ardrossanensis, Tepper, Trans. Roy. Soc. S. Austral ,Vol. 17, p. 92 (1893).
3. *Z. pallida*, Shelford, Blattidæ, in Fauna Südwest Austral.,Vol. 2, Lief. 9, p. 138, pl. 13, f. 7 (1909). — West Australia.
4. *Z. castii*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 92 (1893). — Central Australia.
   Z. robusta, Shelford, Trans. Ent. Soc. Lond. p. 294 (1909). — Central Australia.

7. Genus COSMOZOSTERIA, Stål

Cosmozosteria. Stål, Bih. Svensk. Akad., Vol. 2, nº 13, p. 13 (1874).

Characters. — Ocelli present. Tegminal rudiments absent. Abdomen broader than thorax. Posterior angles of abdominal tergites 5-6 not or scarcely produced, of tergite 7 produced. Angles of

ninth abdominal tergite lobiform. Dorsal surface of abdomen scabrous. Supra-anal and sub-genital laminæ (♂) quadrate. Cerci short. Posterior metatarsus very short, unarmed beneath, its pulvillus occupying the greater part of the joint.

Geographical distribution of species. — Australia.

1. *C. froggatti,* Shelford, Trans. Ent. Soc. Lond. p. 295 (1909). — Queensland.
2. *C. zonata,* Walker, Cat. Blatt. Brit. Mus. p. 159 (1868). — **Pl. 1, Fig. 6.** — Queensland, South Australia.
   Polyzosteria quadrifascia. Walker, ibidem, p. 160 (1868).
   Polyzosteria pectoralis, Walker, ibidem, p. 160 (1868).
   Platyzosteria trifasciata, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 91 (1893).
3. *C. maculimarginata,* Tepper, ibidem. Vol. 19, p. 160 (1895). — Queensland.
4. *C. bicolor,* Saussure, Rev. Zool. (2), Vol. 16, p. 307 (1864) — Queensland, Victoria, New S. Wales.
   Polyzosteria ligata. Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 220 (1865).
   Platyzosteria subzonata, Tepper, Trans. Roy. Soc. S. Austral., Vol. 18, p. 181 (1894).
5. *C. gloriosa,* Shelford, Trans. Ent. Soc. Lond. p. 296 (1909). — Queensland.
6. *C. lateralis,* Walker, Cat. Blatt. Brit. Mus. p. 154 (1868). — Australia.
   Polyzosteria ferruginea, Walker, ibidem, p. 158 (1868).
7. *C. picta,* Tepper, Trans. Roy. Soc. S. Austral., Vol. 18, p. 182 (1894). — Queensland.

8. Genus ANAMESIA, Tepper

Anamesia. Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 69 (1893).
Pseudolampra. Tepper, ibidem, p. 96 (1893).

Characters. — Ocelli present or absent. Pronotum with margins not reflexed nor incrassated. Tegminal rudiments absent. Dorsal surface of abdomen not scabrous, with shallow punctures. Posterior angles of none of the abdominal tergites produced, angles of ninth abdominal tergite often lobiform. Cerci short, flattened. Supra-anal lamina : (♂) quadrate, (♀) trigonal, sub-cucullate. Tibiæ with spines on outer aspect triseriately arranged. Posterior metarsus shorter than remaining joints, not spined beneath, its pulvillus occupying the greater part of the joint.

Geographical distribution of species. — Australia.

1. *A. polyzona,* Walker, Cat. Blatt. Brit. Mus. p. 159 (1868). — **Pl. 1, Fig. 7a.** — West Australia.
   A. polyzona, Shelford, Blattidæ, in Fauna Sudwest Austral., Vol. 2, Lief. 6, p. 130, pl. 13, f. 10 (1909
2. *A. lambii,* Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 70 (1893). — Central Australia.
3. *A. frenchii,* Tepper, ibidem, p. 72 (1893). — **Pl. 1, Fig. 7.** — Queensland, West Australia.
4. *A. lindsayi,* Tepper, ibidem, p. 71 (1893). — West Australia.
5. *A. punctata,* Tepper, ibidem, p. 97 (1893). — West Australia.
6. *A. rothei,* Tepper, ibidem, p. 98 (1893). — South Australia.
7. *A. walkeri,* Shelford, Trans. Ent. Soc. Lond. p. 301 (1909). — New S. Wales.
8. *A. circumcincta,* Walker, Cat. Derm. Salt. Brit. Mus., Vol. 5, Suppl. Blatt. p. 36 (1871). — Australia.

Doubtful species :

9. *A. fulvornata,* Tepper, Trans. Roy. Soc. S. Austral., Vol. 18, p. 177 (1894). — Victoria.
10. *A. ornata,* Tepper, ibidem, Vol. 17, p. 98 (1893). — South Australia.

9. Genus DESMOZOSTERIA, Shelford

Desmozosteria. Shelford, Blattidæ, in Fauna Südwest Austral., Vol. 2, Lief. 9, p. 139 (1909).

Characters. — Allied to *Zonioploca*, but the angles of none of the abdominal tergites backwardly produced. Lateral margins of the pronotum incrassated. Tegminal rudiments absent. Dorsal surface punctate or smooth. Supra-anal lamina : (♂) quadrate, margins entire, (♀) trigonal, cucullate. Cerci short, flattened. Posterior metatarsus very short, not spined beneath.

Geographical distribution of species. — Australia.

1. *D. grosse-punctata*, Shelford, Trans. Ent. Soc. Lond. p. 303 (1909). — Australia.
2. *D. michaelseni*, Shelford, Blattidæ, in Fauna Südwest Austral., Vol. 2, Lief. 9. p. 139, pl. 13, f. 9 (1909). — West Australia.
3. *D. rufescens*, Shelford, ibidem, p. 140 (1909). — West Australia.
4. *D. cincta*, Shelford, Trans. Ent. Soc. Lond. p. 303 (1909). — Central Australia.

10. Genus TEMNELYTRA, Tepper

Temnelytra. Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 38 (1893).

Characters. — Body flattened and depressed. Antennæ longer than the body. Pronotum anteriorly parabolic, posteriorly truncate, exposing the large scutellum. Tegmina quadrate or sub-quadrate, extending to the first abdominal tergite. Wings entirely absent. First abdominal tergite (♂) with scent-gland opening. Posterior angles of distal abdominal tergites produced (*T. undulivitta* Walker, ♂, is an exception). Supra-anal lamina : (♂) quadrate, margins entire, (♀) triangular, apex emarginate. Cerci longer than the lamina in both sexes. Posterior metatarsus very short, spined beneath.

Geographical distribution of species. — Australia, New Zealand.

1. *T. undulivitta*, Walker, Cat. Blatt. Brit. Mus. p. 144 (1868). — New Zealand.
2. *T. truncata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 217 (1865). — **Pl. 1, Figs. 8a, 8b.** — New S. Wales, South Australia.
   T. harpuri, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 39 (1893).
3. *T. subtruncata*, Tepper, ibidem, Vol. 19, p. 164 (1895). — Victoria.

11. Genus SCABINA, Shelford

Scabina. Shelford, Trans. Ent Soc. Lond. p. 305 (1909).

Characters. — Eyes and antennal sockets equally far apart. Ocelli present. Antennæ robust. Pronotum parabolic, posteriorly truncate, exposing the scutellum. Tegmina quadrate, corneous, not extending beyond the first abdominal tergite. Wings rudimentary, squamiform. Posterior angles of abdominal tergites strongly produced backwards. Supra-anal lamina (♂) quadrate, entire. Cerci exceeding the lamina. Styles long, slender. Posterior metatarsus shorter than succeeding joints, not spined beneath, its pulvillus apical.

Geographical distribution of species. — Queensland.

1. *S. antipoda*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 376 (1903). — **Pl. 2, Fig. 9.** — Queensland.

12. Genus METHANA, Stål

Methana. Stål, Oefv. Vet. Akad. Förh., Vol. 34, nº 10, p. 36 (1877).
Wodongia. Tepper, Trans. Roy. Soc. S. Austral., Vol. 19, p. 155 (1895).

Characters. - Antennæ longer than body. Pronotum anteriorly parabolic, almost covering vertex of head, posteriorly very obtusely angled. Scutellum not exposed. Tegmina and wings fully developed, at least as long as the abdomen, generally longer. Supra-anal lamina : (♂) quadrate, margins not serrate, (♀) triangular, apex emarginate. Cerci long, acuminate. Femora heavily spined. Posterior metatarsus about equal in length to remaining joints, biseriately spined beneath, its pulvillus apical; remaining joints of tarsus with large pulvilli, not spined beneath.

Geographical distribution of species. — Borneo, New Guinea, Australia.

1. *M. magna*, Shelford, Trans. Ent. Soc. Lond. p. 307 (1909). — Borneo.
2. *M. hosei*, Shelford, ibidem, p. 309 (1909). — Borneo.
3. *M. papua*, Shelford, Mém. Soc. Ent. Belg., Vol. 15, p. 234 (1908). — New Guinea.
4. *M. convexa*, Walker, Cat. Derm. Salt. Brit. Mus. Suppl. Blatt. p. 152 (1869). — Queensland, New S. Wales.
   M. rufescens, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 374 (1903).
5. *M. curvigera*, Walker, Cat. Blatt. Brit. Mus. p. 134 (1868). — Queensland.
6. *M. marginalis*, Saussure, Rev. Zool. (2), Vol. 16, p. 319 (1864) — Pl. 2, Fig. 10. — Queensland, New S. Wales.
   Periplaneta ligata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 234 (1865).
7. *M. soror*, Saussure, Rev. Zool. (2), Vol. 16, p. 319 (1864). — Australia.
   Periplaneta biquadrata, Walker, Cat. Blatt. Brit. Mus. p. 134 (1868).
   Periplaneta oculata, Walker, Cat Derm. Salt. Brit. Mus. Suppl. Blatt. p. 152 (1869).
   Wodongia lunata, Tepper, Trans. Roy. Soc. S. Austral. Vol. 19, p. 155 (1895).

Doubtful species :

8. *M. pallipalpis*, Serville, Hist. Nat. Ins. Orth. p. 71 (1839). — Java, Sumatra, Australia.

13. Genus PARAMETHANA, Shelford

Paramethana. Shelford, Sjöstedt's Kilimandjaro-Meru Exped. Blatt. p. 31 (1907).

Characters. — Differs from *Methana* in the short tegmina and wings of the female, which do not extend beyond the fifth abdominal tergite and in the discoidal pronotum. Third antennal joint nearly three times longer than the second

Geographical distribution of species. — East Africa.

1. *P. robusta*, Shelford, Sjöstedt's Kilimandjaro-Meru Exped. Blatt. p. 31, pl. 2, f. 7 (1907). — German E. Africa.
2. *P. buyssoni*, Shelford, Deutsche Ent. Zeitschr. p. 618 (1909). — Pl. 2, Fig. 11. — German E. Africa.

14. Genus THYRSOCERA, Burmeister

Thyrsocera. Burmeister, Handb. Ent., Vol. 2, p. 498 (1838).

Characters. — Sexes similar, completely winged. Antennæ incrassated in basal half and plumose. Pronotum trapezoidal, sides deflexed. Tegmina and wings exceeding the apex of the abdomen

Cerci moderately long, flattened, spatulate. Femora sparsely armed. Tibial spines on outer aspect tri-seriately arranged. Posterior metatarsus equalling the length of the remaining joints, spined beneath, its pulvillus small, apical; pulvilli of second and third joints larger, occupying the greater extent of the joint.

Geographical distribution of species. — India, Ceylon, Malay Peninsula.

1. *T. spectabilis*, Burmeister, Handb. Ent., Vol. 2, p. 498 (1838). — India, Ceylon.
2. *T. speciosum*, Walker, Cat. Blatt. Brit. Mus. p. 214 (1868). — Malay Peninsula.
   T. speciosum, Shelford, Trans. Ent. Soc. Lond. p. 250, pl. 14, f. 5 (1906).

15. Genus EURYCOTIS, Stål

Eurycotis. Stal, Bih. Svensk. Akad , Vol. 2, n° 13, p. 13 (1874).

Characters. — Eyes on vertex of head further apart than the antennal sockets. Pronotum trapezoidal, not covering vertex of head. Tegmina squamiform or quadrate and not extending beyond the metanotum. Wings absent or squamiform. Tibial spines on outer aspect tri-seriately arranged. Tarsi as in *Polyzosteria, Platyzosteria*, etc.

Geographical distribution of species. — Florida, Central and South America, West Indies.

1. *E. floridana*, Walker, Cat. Blatt. Brit. Mus. p. 135 (1868). — Pl. 2, Fig. 12. — Florida.
   Platyzosteria sabalianus, Scudder, Proc. Boston Soc. Nat. Hist. Vol. 19, p. 93 (1877). —
2. *E. ingens*, Scudder, ibidem, p. 92 (1877). — Florida.
3. *E. semipicta*, Walker, Cat. Blatt. Brit. Mus. p. 141 (1868). — Florida.
4. *E. mexicana*, Saussure, Rev. Zool. (2), Vol. 14, p. 163 (1862). — Mexico.
   Polyzosteria azteca, Saussure, ibidem, p. 163 (1862).
5. *E. mysteca*, Saussure, ibidem, p. 170 (1862). — Mexico.
   Polyzosteria rufovittata, Brunner von Wattenwyl, Nouv. Syst. des Blatt p. 215 (1865).
6. *E. vittifrons*, Saussure & Zehntner, Biol. Centr. Amer. Orth., Vol. 1, p. 71 (1893). — Guatemala.
7. *E. quadrisquamata*, Saussure & Zehntner, ibidem, p. 71, pl. 4, f. 40 (1893). — Guatemala.
8. *E. subalata*, Saussure & Zehntner, ibidem, p. 72 (1893). — Colombia.
9. *E. cothurnata*, Giglio-Tos, Boll. Mus. Zool. Anat. Torino, Vol. 13, [illegible] p. 11 (1898). — Ecuador.
10. *E. occidentalis*, Saussure, Rev. Zool. (2), Vol 16, p. 318 (1864). — West Indies.
11. *E. opaca*, Brunner von Wattenwyl, Nouv. Syst des Blatt. p. 216 (1865). — Cuba.
12. *E. dimidiata*, Bolivar, Mém. Soc. Zool. Fr., Vol. 1, p. 125 (1888). — Cuba.
13. *E. caraibea*, Bolivar, ibidem, p. 126 (1888). — Cuba.
14. *E. flavipennis*, Saussure & Zehntner, Biol. Centr. Amer. Orth. Vol. 1, p. 71 (1893). — Cuba.
15. *E. finschiana*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève,, Vol. 23, p. 111 (1879). — Cuba.
    Polyzosteria cabrerae, Bolivar, An. Soc. Esp. Hist. Nat. p. 355, pl. 8, f. 3 (1881).
16. *E. bahamensis*, Rehn, Bull. Amer. Mus. Nat. Hist., Vol. 22, p. 110 (1906). — Bahamas.

Doubtful species :

17. *E. australis*, Burmeister, Handb. Ent., Vol. 2, p. 483 (1838). — Brazil.

16. Genus PELMATOSILPHA, Dohrn

Pelmatosilpha. Dohrn, Stett. Ent. Zeit., Vol. 48, p. 410 (1887).

Characters. — Eyes on vertex of head further apart than the antennal sockets. Pronotum trapezoidal, not covering vertex of head. Tegmina and wings completely developed but not exceeding the apex of the abdomen, or tegmina reduced, not surpassing the fifth abdominal tergite, and wings reduced or rudimentary. Tibial spines on outer aspect triseriately arranged. Tarsi as in *Polyzosteria*, *Platyzosteria*, etc.

Geographical distribution of species. — Texas, Central and South America, Ceylon.

1. *P. rotundata*, Scudder, Proc. Davenport Acad. Nat. Sc., Vol. 8, p. 93, pl. 2, f. 5 (1900). — Texas, Panama.
2. *P. villana*, Saussure & Zehntner, Biol. Centr Amer. Orth., Vol. 1, p. 72, pl. 4, ff. 41, 42 (1893). — Panama.
3. *P. alaris*, Saussure, Rev. Zool. (2), Vol. 16, p. 319 (1864). — Brazil.
4. **P. convexa, nov. sp.** (1). — Brazil.
5. *P. praestans*, Dohrn, Stett. Ent. Zeit., Vol. 48, p. 411 (1887). — Peru.
   P. aterrima, Walker, Cat. Derm. Salt. Brit. Mus. Suppl. Blatt. p. 151 (1869).
6. *P. marginalis*, Brunner von Wattenwyl, Proc. Zool. Soc. Lond. p. 603, pl. 52, f. 2 (1893). — Grenada.
7. *P. purpurascens*, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 375 (1903). — **Pl. 2, Fig. 15.** — Dominica.
8. *P. decipiens*, Kirby, ibidem, p. 376 (1903). — Trinidad.
9. *P. coriacea*, Rehn, Trans. Amer. Ent. Soc., Vol. 29, p. 278 (1903). — Porto Rico.
10. *P. sinhalensis*, Shelford, Jahrb. Ver. Naturk. Wiesbaden, Vol. 61, p. 33 (1908). — Ceylon.

Doubtful species :

11. *P. occidentalis*, Burmeister, Handb. Ent., Vol. 2, p. 483 (1838). — Colombia.

17. Genus DORYLÆA, Stål

Dorylæa. Stål, Oefv. Vet.-Akad. Förh., Vol. 34, nº 10, p. 36 (1877).

Characters. — Sexes similar. Pronotum anteriorly arcuate, posteriorly truncate. Tegmina semi-corneous, venation obsolete not extending beyond the fourth or fifth abdominal tergite. Wings reduced or fully developed. Tibial spines triseriately arranged on the outer aspect of the tibiæ. Posterior metatarsi exceeding the following joints in length, armed beneath; second joint short armed beneath, third joint unarmed; pulvilli moderately enlarged.

Geographical distribution of species. — Malay Archipelago, Madagascar.

1. *D. flavicincta*, de Haan, in Temminck, Verhand. Nat. Ges. Orth. p. 50 (1842). — Borneo, Java, Sumatra, Madagascar.
   Methana zehntneri, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 374 (1903).

(1) **P. convexa, nov. sp.** — *Female.* — Convex, nitid. Head, pronotum, anal field of left tegmen, a triangular marking at base of right tegmen, abdomen and legs, castaneous. Pronotum parabolic, posteriorly truncate. Tegmina ovate, extending to base of supra-anal lamina, corneous ochreous except for the castaneous areas and for some castaneous points between the obsolete veins, anal vein absent. Wings equal in length to tegmina, semi-corneous, anterior part densely flavo-reticulate. Supra-anal lamina produced, cucullate, posteriorly faintly emarginate. Abdomen piceous at base beneath. Posterior metatarsus much shorter than the succeeding joints. — Total length 21 mm.; length of tegmina 12.5 mm.; pronotum 6 mm. × 9 mm. Espirito Santo.

2. *D. brunneri*, Stål, Oefv. Vet.-Akad. Förh., Vol. 34, nº 10, p. 37 (1877). Philippines.
3. **D. unicolor, nov. sp.** (1). Talaut Isl.

18. Genus STYLOPYGA, Fischer von Waldheim

Stylopyga. Fischer von Waldheim, Orth. Ross. p. 68 (1846); Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 222 (1865).

Characters. — Sexes similar. Tegmina reduced to squamiform lobes, wings absent. Sixth abdomina tergite not enlarged nor declivous. Tibial spines on outer aspect triseriately arranged. Posterior metatarsus longer than the succeeding joints, spined beneath, its pulvillus small, apical; second and sometimes the third joint spined beneath, all the pulvilil small, apical.

Geographical distribution of species. — Cosmopolitan.

1. *S. rhombifolia*, Stoll, Spectres, Blatt. etc. p. 5, pl. 3*d*, f. 13 (1813). Cosmopolitan.
   Periplaneta histrio, Saussure, Rev. Zool. (2), Vol. 16, p. 318 (1864).
   Periplaneta decorata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 224 (1865).
   Polyzosteria heterospila, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 35 (1871).
2. *S. ornata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 225 (1865). India. — **Pl. 2, Fig. 13.**
3. *S. sex-pustulata*, Walker, Cat. Derm. Salt. Brit. Mus. Vol. 5, Suppl. Blatt. p. 36 (1871) India.
   Blatta bioculata, Paiva, Journ. Proc. Asiat. Soc. Bengal, Vol. 2, p. 346 (1906).
4. *S. parallela*, Bolivar, Ann. Soc. Ent. Fr. p. 299 (1897). South India.
5. *S. picea*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 223 (1865). Nicobar Isl.
6. *S. semoni*, Krauss, Denkschr. Med.-nat. Ges. Jena, Vol. 8, p. 751 (1903). Java.
7. *S. quadrilobata*, Brunner von Wattenwyl, Abhandl. Senckenb. Ges. Frankf., Vol. 24, p. 209 (1898). Celebes.
8. *S. coxalis*, Walker, Cat. Blatt Brit. Mus. p. 138 (1868). Ceram, New Guinea.
9. **S. salomonis, nov. sp.** (2). Solomon Isl.
10. *S. manca*, Gerstäcker, Mitt. Ver. Neuvorpomm. u. Rügen, Vol. 14, p. 48 (1883) Kamerun.
11. *S. anthracina*, Gerstäcker, ibidem, p. 49 (1883). Kamerun.
12. *S. furcifera*, Shelford, Jahrb. Ver. Naturk. Wiesbaden, Vol. 61, p. 31, pl. 1, f. 1 (1908). Kamerun.
13. *S. assimilis*, Shelford, ibidem, p. 31, pl. 1, f. 2 (1908). Kamerun.
14. *S. nigerrima*, Shelford, ibidem, p. 31, pl. 1, f. 3 (1908). Kamerun.
15. *S. spinulifera*, Krauss, Zool. Jahrb. Abt. f. Syst., Vol. 5, p. 650, pl. 45, f. 1 (1891). San Thomé.
16. *S. hottentota*, Saussure, Abhandl. Senckenb. Ges. Frankf., Vol. 21, p. 578 (1899). South Africa.
17. *S. tetra*, Walker, Cat. Blatt. Brit. Mus. p. 138 (1868). South Africa.

(1) **D. unicolor, nov. sp.** — *Female.* — Unicolorous castaneous. Antennæ except at base rufous; clypeus rufous. Tegmina and wings extending to base of supra-anal lamina. Penultimate abdominal tergite produced, emarginate in the middle. Supra-anal lamina triangular, apex deeply cleft. Cerci moderate, exceeding the supra-anal lamina. Posterior metatarsus equal in length to succeeding joints spined beneath, its pulvillus smal apical; second tarsal joint spined beneath, its pulvillus occupying half the joint; remaining pulvilli large. — Total length 24 mm; length of tegmina 14.5 mm.; pronotum 8.5 mm × 10 mm. — Talaut Isl. (Type in Oxford Museum.)

(2) **S. salomonis, nov. sp.** — *Male.* — Allied to *S. quadrilobata* Brunner von Wattenwyl, but with the pronotum and tegminal rudiments outwardly margined with ochreous. Tegminal rudiments punctate. Wings-rudiments impunctate. Supra anal lamina trapezoidal, sub-cucullate, posteriorly faintly emarginate. Sub-genital lamina sub-quadrate, some fine spiniform setæ situated on the posterior margin at the base of the styles which are stout. Front coxæ testaceous, mid- and hind-coxæ outwardly margined with testaceous. — Total length 20 mm.; length of tegmina 3.5 mm; pronotum 7.5 mm. × 10 mm. — Solomon Isl. (Type in coll. W. W. Froggatt.)

18. *S. senecta*, Rehn, Proc. U. S. Nat. Mus., Vol. 27, p. 554 (1904). South Africa.
19. *S. bimaculata*, Walker, Cat. Blatt. Brit. Mus. p. 139 (1868). Natal.
20. *S. voeltzkowi*, Saussure, Abhandl. Senckenb. Ges. Frankf., Vol. 21, p. 579 (1899). Madagascar.
21. *S. nossibei*, Saussure, ibidem, p. 580 (1899). Madagascar.
22. *S. zamorensis*, Giglio-Tos, Mus. Boll. Zool. Anat. Torino, Vol. 13, nº 311, p. 10 (1898). Ecuador.
23. *S. antillarum*, Brunner von Wattenwyl, Proc. Zool. Soc. Lond. p. 204, pl. 15, f. 5 (1892). St. Vincent.
24. *S. meridionalis*, Bruner, Journ. New York Ent. Soc., Vol. 14, p. 141 (1906). Trinidad.

Doubtful species :

25. *S. signata*, Eschscholtz, Entomographien, p. 88 (1822) Philippines.

19. Genus BLATTA, Linnæus

Blatta. Linnæus, Syst. Nat. (ed. 10), Vol. 1, p. 424 (1758).
Kakerlac. Latreille, Fam. Nat. Règne Anim. p. 411 (1825).
Stoleopyga. Fischer von Waldheim, Bull. Soc. Nat. Moscou, Vol. 6, pp. 356, 366 (1833).

Characters. — Sexes dissimilar. Antennæ long, setaceous. Pronotum trapezoidal, not covering vertex of head. Tegmina and wings of ♂ variable, not attaining the apex of the abdomen. Wings of ♀ absent, tegmina squamiform or quadrate. Femora strongly armed; tibial spines on outer aspect triseriately arranged. Tarsi elongate, metatarsi longer than the succeeding joints, spined beneath, second joint long and spined beneath, third and fourth joints shorter, spined beneath; all the pulvilli minute, apical.

Geographical distribution of species. — Cosmopolitan.

1. *B. orientalis*, Linnæus, Syst. Nat. (ed. 10), Vol. 1, p. 424 (1758). Palæarctic region.
   Blatta culinaris, De Geer, Mém. Ins. Vol. 3, p. 530, pl. 25, ff. 1-7 [illegible].
   Blatta ferrugineofusca, Gronovius, Zoophylacium, Vol. 2, p. 174 (17[illegible]).
   Blatta ferruginea, Thunberg, Vet.-Akad. nya Handl., Vol. 31, p. 187 (1810).
   Kakerlak castanea, Blanchard, *in* Gay, Hist. fis. Chile, Zool., Vol. 6, p. 18, Orth. pl. 1, f. 2 (1852).
   Kakerlak platystetho, Philippi, Zeitschr. ges. Naturw., Vol. 21, p. 221 (1863).
   Blatta badia, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 150, pl. 1, f. 1[illegible]
   Periplaneta lateralis, Walker, Cat. Blatt. Brit. Mus. p. 136 (1868).
2. *B. sinuata*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 32, p. 35, pl. 1, f. 12 (1893). Burma.
3. **B. speciosa, nov. sp.** (1). India.
4. *B. concinna*, de Haan, *in* Temminck, Verhand. Nat. Ges. Orth. p. 50 (1842). Japan, Hong-Kong, Malay Archipelago, Australia.
   Periplaneta borrei, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 113, pl. 10, f. 38 (1873).
   Blatta brunneri, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 12, p. 375 (1903).

(1) **B. speciosa, nov. sp.** — *Female.* — Head, pronotum and tegmina rufo-castaneous. Pronotum laterally margined with paler colour, the bands expanding and extending inwards at the posterior angles. Tegmina quadrate, not extending beyond the thorax, overlapping at the sutural margins, posterior margins concave, anal vein impressed, its apex reaching the inner posterior angle of the tegmen. Abdomen above piceous, fourth to sixth tergites with an ochreous macula at each side, seventh tergite very large, eighth tergite produced in the middle. Supra-anal lamina tectiform, apex triangularly emarginate. Abdomen beneath castaneous. Anterior coxæ testaceous; legs castaneous. — Total length 34 mm.; length of tegmina 8.5 mm.; pronotum 11 mm. × 14 mm. — India, Sangli. (Type in Oxford University Museum.)

5. *B. agaboides*, Gerstäcker, Mitt. Ver. Neuvorpomm. u. Rügen, Vol. 14, p. 47 (1883). — Kamerun, Assinie.
   Periplaneta assiniensis, Bolivar, Ann. Soc. Ent. Fr. p. 172, pl. 1, f. 1 (1893).
6. *B. flavilatera*, Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 76 (1895). — Gallaland.
7. *B. ugandana*, Giglio-Tos, Boll. Mus. Zool. Anat. Torino, Vol. 22, n° 556, p. 2 (1907). — Uganda.
8. *B. montana*, Kirby, Trans. Zool. Soc. Lond., Vol. 19, p. 63 (1909). — Ruwenzori.
9. *B. propinqua*, Shelford, Sjöstedt's Kilimandjaro-Meru Exped., Blatt. p. 31 (1907). — Kilimandjaro.
10. *B. hova*, Saussure, Soc. Ent.-Zurich, Vol. 6, p. 17 (1891). — Madagascar.
11. *B. meridionalis*, Saussure, Rev. Zool. (2), Vol. 16, p. 306 (1864). — South Africa.
    Deropeltis bivittata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 247 (1865).
    Deropeltis distanti, Kirby, Ann. Mag. Nat. Hist. (7), Vol. 5, p. 284 (1900).
12. *B. rufa*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 17, p. 101 (1903). — Central Australia.
13. *B. rotundata*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 230 (1865). — Fiji.
14. *B. pallipes*, Philippi, Zeitschr. f. Naturw., Vol. 21, p. 222 (1863). — Chili.
15. *B. brevipes*, Philippi, ibidem, p. 223 (1863). — Chili.

20. Genus CARTOBLATTA, Shelford

Cartoblatta. Shelford, Sjöstedt's Kilimandjaro-Meru Exped., Blatt., p. 33 (1907).

Characters. — Allied to *Blatta* Linnæus and *Pseudoderopeltis* Krauss. Pronotum (♂) transversely elliptical, its anterior border truncate, its posterior border slightly produced. Meso- and metanotum (♂) without backwardly-directed membranous processes. Tegmina and wings (♂) considerably exceeding the apex of the abdomen. Tegmina (♀) short and quadrate, not covering the first abdominal tergite, their sutural margins touching; wing-rudiments present. No scent-gland opening on dorsum of abdomen (♂). Tarsi as in *Blatta*.

Geographical distribution of species. — East Africa.

1. *C. pulchra*, Shelford, Sjöstedt's Kilimandjaro-Meru Exped., Blatt. p. 33, pl. 2, f. 4 (1907). — Kilimandjaro.

21. Genus PSEUDODEROPELTIS, Krauss

Pseudoderopeltis. Krauss, Zool. Jahrb. Abt. f. Syst., Vol. 5, p. 652 (1891).

Characters. — Resembles *Periplaneta* Burmeister, but male with the posterior angles of the meso- and metanotum produced as slender, membranous processes; a scent-gland opening on the first abdominal tergite. Female with lobiform tegmina, the sixth and seventh abdominal tergites declivous forming an angle with the preceding tergites and enlarged. Tarsi as in *Blatta*.

Geographical distribution of species. — Africa.

1. *P. adelungi*, Werner, Sitzungsb. Akad. Wiss. Wien, Vol. 116, Abt. 1, p. 11 (1907). — Egyptian Sudan.
2. *P. discrepans*, Adelung, Ann. Mus. Zool. St-Pétersb., Vol. 8, p. 312, pl. 20, f. 14 (1903). — Abyssinia.
3. *P. gildessa*, Adelung, ibidem, p. 314, pl. 20, f. 4 (1903). — Abyssinia.
4. *P. saussurei*, Adelung, ibidem, p. 316, pl. 20, f. 5 (1903). — Abyssinia.
5. *P. conspersipennis*, Adelung, ibidem, Vol. 9, p. 448 (1905). — Abyssinia.

6. *P. spectabilis*, Adelung, ibidem, p. 451 (1905). — Abyssinia.
7. *P. brunneriana*, Schulthess, Ann. Mus. Stor. Nat. Genova, Vol. 39, p. 167. pl. 2, f. 1 (1898). — Somaliland.
8. *P. guttata*, Saussure, ibidem, Vol. 35, p. 75 (1895). — Gallaland, Rhodesia.
9. *P. rothschildi*, Shelford, Ann. Mag. Nat. Hist. (7), Vol. 19, p. 39 (1907). — British E. Africa.
10. *P. fulvornata*, Shelford, Sjöstedt's Kilimandjaro-Meru Exped., Blatt. p. 34. pl. 2, f. 9 (1907). — Kilimandjaro.
11. *P. petrophila*, Shelford, ibidem, p 34, pl. 2, ff. 5, 6 (1907). — Kilimandjaro.
12. *P. granulifera*, Krauss, Zool. Jahrb. Abt. f. Syst., Vol. 5, p. 653 (1891). — Rhodesia.
13. *P. bicolor*, Thunberg, Vet.-Akad. nya Handl , Vol. 31, p. 187, pl. 5, f. A (1810). — South Africa.
    Periplaneta orba, Stål, Oefv. Vet.-Akad. Förh. Vol. 13, p. 167 (1856).
    Ischnoptera juncea, Saussure, Rev. Zool. (2), Vol. 16, p. 314 (1864).
    Nauphoeta foveolata, Walker, Cat. Blatt. Brit. Mus. p. 42 (1868).
14. *P. similis*, Saussure, Rev. Zool. (2), Vol. 16, p. 314 (1864). — South Africa.
    ? *Ischnoptera longipennis*, Walker, Cat. Blatt Brit. Mus. p. 117 (1868).
15. *P. antennata*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 116, pl. 10, f. 39 (1873). — South Africa.
16. *P. longipennis*, Saussure, ibidem, p. 117 (1873). — South Africa.
    Deropeltis saussurei, Kirby, Ann Mag. Nat. Hist. (7), Vol. 12, p. 377 (1903).
17. *P. anthracina*, Brancsik, Jahresh. Ver. Trencsin. Comit. Vol. 17-18, p. 244, pl. 7, f. 2 (1897). — Zambesi.
    Stylopyga brancsiki, Shelford, Sjöstedt's Kilimandjaro-Meru Exped. Blatt. p. 32 (1907).
18. *P. albilatera*, Stål, Oefv. Vet.-Akad. Förh., Vol. 13, p. 167 (1856). — South Africa.
    Polyzosteria capensis, Saussure, Rev. Zool. (2), Vol. 16, p. 307 (1864).
    Deropeltis flavomarginata, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 247 (1865).
    Periplaneta collaris, Walker, Cat. Blatt. Brit. Mus. p. 142 (1868).
    Periplaneta decorata, Walker, ibidem, p. 142 (1868).
19. *P. diluta*, Stål, Oefv. Vet.-Akad. Förh. Vol. 13, p. 167 (1856). — South Africa.
    Periplaneta(1) *africana*, Karny, Denkschr. Med.-nat. Ges. Jena, Vol. 13, p. 380, pl. 21, ff. 25, 26 (1908).
20. *P. flavescens*, Krauss, Zool. Jahrb. Abt. f. Syst., Vol. 5, p. 654 (1891). — Cape.
    Pl. 2, Fig. 14.
21. *P. prorsa*, Shelford, Mém. Soc. Ent. Belg., Vol. 15, p. 234 (1908). — Congo.
22. *P. aethiopica*, Saussure, Rev. Zool. (2), Vol. 16, p. 317 (1864). — Gaboon.

Doubtful species :

23. *P. brevicollis*, Serville, Hist. Nat. Ins Orth. p. 170 (1839). — South Africa.
24. *P. dimidiata*, Walker, Cat. Blatt. Brit. Mus. p. 116 (1868). — Natal.

22. Genus PERIPLANETA, Burmeister

Periplaneta. Burmeister, Handb. Ent., Vol. 2, p. 502 (1838).
Cacerlaca. Saussure, Mém. Hist. Nat. Mexique, Blatt. p. 69 (1864).

Characters. — Sexes similar. Antennæ very long, slender. Pronotum trapezoidal, not covering vertex of head, sides deflexed, its greatest width behind the middle. Posterior angles of meso- and metanotum not produced as slender membranous processes. Tegmina and wings usually extending considerably beyond the apex of the abdomen, the former coriaceous. Cerci and genital styles long.

(1) *Periplaneta adelungi* Karny, is a species of *Ischnoptera*.

Legs long; femora and tibiæ strongly spined, tibial spines triseriately arranged. Tarsi long and slender, posterior metatarsus longer than remaining joints; all the joints spined beneath, their pulvilli minute, apical.

Geographical distribution of species. — Cosmopolitan.

1. *P. americana*, Linnæus, Syst. Nat. (ed. 10), Vol. 1, p. 424 (1758). — Cosmopolitan.
   Blatta kakkerlac, De Geer, Mém. Ins., Vol. 3, p. 535, pl. 44, ff. 1-3 (1773).
   Blatta aurelianensis, Fourcroy, Ent. Paris, Vol. 1, p. 177 (1785).
   Blatta siccifolia, Stoll, Spectres, Blatt. etc. p. 5, pl. 3*d*, ff. 10, 11 (1813).
   Blatta aurantiaca, Stoll, ibidem, p. 5, pl. 3*d*, f. 14 (1813).
   Periplaneta stolida, Walker, Cat. Blatt. Brit. Mus. p. 128 (1868).
2. *P. australasiae*, Fabricius, Syst. Ent. p. 271 (1775). — Cosmopolitan.
   Blatta domingensis, Beauvois, Insect. Afr. Amér. p. 182, Orth. pl. 1, f. 4 (1804).
   Periplaneta zonata, de Haan, *in* Temminck, Verhand. Nat. Ges. Orth. p. 49 (1842).
   Periplaneta repanda, Walker, Cat. Blatt. Brit. Mus. p. 125 (1868).
   Periplaneta subcincta, Walker, ibidem, p. 126 (1868).
   Periplaneta inclusa, Walker, ibidem, p. 126 (1868).
   Periplaneta emittens, Walker, Cat. Derm. Salt. Brit. Mus., Vol. 5, Suppl. Blatt. p. 37 (1871).
   Polyzosteria subornata, Walker, ibidem, p. 35 (1871).
3. *P. furcata*, Karny, Wiss. Ergebn. Exped. Filchner China u. Tibet, Bd. 10, Teil 1, p. 19 (1908). — Asia Minor.
4. *P. tartara*, Saussure, *in* Fedtschenko, Reise Turkestan, Orth. p. 9 (1874). — Turkestan.
5. *P. filchnerae*, Karny, Wiss. Ergebn. Exped. Filchner China u. Tibet, Bd. 10, Teil, 1, pp. 18, 19, pl. 1, ff. 1-4 (1908). — China.
6. *P. japonica*, Karny, ibidem, p. 18 (1908). — Japan.
7. *P. emarginata*, Karny, ibidem, p. 19 (1908). — Japan.
8. *P. picea*, Shiraki, Annot. Zool. Japon., Vol. 6, p. 26, pl. 2, f. 3 (1906). — Japan.
9. *P. striata*, Shiraki, ibidem, p. 27, pl. 2, f. 5 (1906). — Japan.
10. *P. lata*, Herbst, Fuessly Archiv, Vol. 7-8, p. 185, pl. 49, f. 7 (1786). — Borneo.
    — **Pl. 2, Fig. 16.**
11. *P. monochroma*, Walker, Cat. Derm. Salt. Brit. Mus., Vol. 5, Suppl. Blatt. p. 37 (1871). — Bombay.
12. *P. curta*, Walker, ibidem, p. 38 (1871). — Bombay.
13. *P. indica*, Karny, Wiss. Ergebn. Exped. Filchner China u. Tibet, Bd. 10, Teil 1, p. 18 (1908). — India.
14. *P. ceylonica*, Karny, ibidem, p. 18 (1908). — Ceylon.
15. *P. affinis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 20, p. 261 (1869). — India (?).
16. *P. valida*, Brunner von Wattenwyl, Ann. Mus. Stor. Nat. Genova, Vol. 33, p. 36, pl. 1, f. 13 (1893). — Burma.
17. *P. gracilis*, Brunner von Wattenwyl, ibidem, p. 36, pl. 1, f. 14 (1893). — Burma.
18. *P. regina*, Saussure, Rev. Zool. (2), Vol. 16, p. 320 (1864). — Malacca.
19. *P. malaica*, Karny, Wiss. Ergebn. Exped. Filchner China u. Tibet, Bd. 10, Teil 1, p. 19 (1908) — Banguey.
20. *P. crassa*, Karny, ibidem, p. 19, pl. 1, f. 5 (1908). — Borneo.
21. *P. spinosostylata*, Krauss, Denkschr. Med.-nat. Ges. Jena, Vol. 8, p. 752, pl. 67, f. 2 (1903). — Java.
22. *P. nitida*, Bolivar, An. Soc. Esp. Hist. Nat., Vol. 19, p. 302 (1890). — Philippines.
23. *P. methanoides*, Brunner von Wattenwyl, Abhandl. Senckenb. Ges. Frankf., Vol. 24, p. 209, pl. 16, f. 14 (1898). — Gilolo, Ambon.
24. *P. basedowi*, Tepper, Trans. Roy. Soc. S. Austral., Vol. 28, p. 162, pl. 32 (1904). — South Australia.

25. *P. savignyi*, Krauss, Verh. Zool.-bot. Ges. Wien, Vol. 40, p. 242 (1890). Egypt.
26. *P. lebedinskii*, Adelung, Ann. Mus. Zool. St-Pétersb., Vol. 8, p. 305 (1904). Abyssinia.
27. *P. vosseleri*, Shelford, Jahrb. Ver. Naturk. Wiesbaden, Vol. 61, p. 38 (1908). German E. Africa.
28. *P. atricollis*, Saussure, Abhandl. Senckenb. Ges. Frankf. Vol. 21, p. 580 (1899). South Africa.
29. *P. caffra*, Stâl, Oefv. Vet.-Akad. Förh., Vol. 13, p. 106 (1856). Natal.
30. *P. patens*, Walker, Cat. Blatt. Brit. Mus. p. 127 (1868). Congo.
31. *P. funebris*, Shelford, Deutsche Ent. Zeitschr. p. 122 (1908). Kamerun.
32. *P. bicolor*, Shelford, ibidem, p. 122 (1908). Kamerun, Congo.
33. *P. stygia*, Shelford, ibidem, p. 619 (1909). Kamerun.
34. *P. fuliginosa*, Serville, Hist. Nat. Ins. Orth. p. 70 (1839). North America.
35. *P. insignis*, Serville, ibidem, p. 67 (1839). Cayenne.
36. *P. brunnea*, Burmeister, Handb. Ent. Vol. 2, p. 503 (1838). Demerara.
37. *P. truncata*, Krauss, Zool. Anzeig., Vol. 15, p. 165 (1892). Cosmopolitan.

Doubtful species :

38. *P. heros*, Eschscholtz, Entomographien, p. 83 (1822). Philppines.
39. *P. australis*, MacLeay, in King, Survey Coasts Austral. Vol. 2, p. 454 (1827). N. Australia.
40. *P. cylindrica*, Thunberg, Mém. Acad. Sc. St-Péterb. Vol. 10, p. 279 (1826). ? Hab.

23. Genus HOMALOSILPHA, Stâl

Homalosilpha. Stâl, Bih. Svensk. Akad., Vol. 2, n° 13, p. 13 (1874).

Characters. — Closely resembles *Periplaneta* Burmeister, but the pronotum discoïdal, its sides not deflexed, its greatest width at the middle.

Geographical distribution of species. — India to Sunda Islands, Philippines, Kamerun, Uganda.

1. *H. ustulata*, Burmeister, Handb. Ent., Vol. 2, p. 503 (1838). India to Great Sunda Isl.
   Kakerlac thoracica, Serville, Hist. Nat. Ins. Orth. p. 69, pl. 2, f. 1 (1839).
   Periplaneta configura a, Walker, Cat. Blatt. Brit. Mus. p. 145 (1868).
2. **H. gaudens, nov. sp.** (1). Tonkin.
3. *H. contraria*, Walker, Cat. Blatt. Brit. Mus. p. 131 (1868). Philippines.
4. *H. decorata*, Serville, Hist. Nat. Ins. Orth. p. 99 (1839). Borneo.
   H. decorata, Shelford, Trans. Ent. Soc. Lond. p. 270, pl. 14, f. 8 (1906).
5. *H. vicina*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 236 (1865). Kamerun.
   Pl. 2, Fig. 17.
6. *H. cruralis*, Shelford, Deutsche Ent. Zeitschr. p. 121, pl. 2, f. 8*c* (1908). Uganda.

24. Genus EROBLATTA, nov. gen.

Characters. — Antennæ moniliform, shorter than the body. Pronotum almost rectangular, as long as broad, sides not deflexed. Tegmina and wings considerably exceeding the apex of the abdomen;

(1) **H. gaudens, nov. sp.** — *Male.* — Piceous. Pronotum broadly bordered anteriorly and laterally with ochreous, disc with obscure impressions. Tegmina unicolorous Wings castaneous. Supra-anal lamina quadrate, the posterior angles acute, posteriorly concave, surpassing the subgenital lamina which is quadrate, with the posterior angles acute. Genital styles slender. Cerci moderate. Coxæ and femora piceous, tibiæ and tarsi rufescent. — Total length 30 mm.; length of body 23 mm.; length of tegmina 23 mm.; pronotum 7 mm. × 9 mm. — Tonkin. (Type in Oxford Museum.)

the former narrow with the anal field long and pointed, the marginal field deflexed. Cerci long and pointed. Femora strongly armed beneath. Spines on outer aspect of tibiæ triseriately arranged. Posterior metatarsi longer than the succeeding joints, its pulvillus apical. Arolia moderate.

Geographical distribution of species. — Borneo.

1. *E. borneensis*, Shelford, Ann. Mag. Nat. Hist. (8), Vol. 1, p. 159, pl. 9, f. 2 (1908). Borneo.

25. Genus DEROPELTIS, Burmeister

Deropeltis. Burmeister, Handb. Ent., Vol. 2, p. 486 (1838).
Euryzosteria. Saussure, Rev. Zool. (2), Vol. 16, p. 316 (1864).

Characters. — Males with well-developed tegmina and wings; females entirely apterous. Vertex of head not hidden by pronotum. Antennæ incrassated. Pronotum : (♂) discoidal, (♀) posteriorly truncate, posterior angles often produced. Posterior margin of fifth abdominal tergite sinuate. Supra-anal lamina : (♂) quadrate, (♀) triangular, cucullate. Legs long and slender; femora very sparsely armed; tibiæ with spines on outer aspect biseriately arranged; tarsi moderate, posterior metatarsi equal to the succeeding joints in length, armed beneath, pulvilli in the male small, in the female large.

Geographical distribution of species. — Africa and Madagascar.

.	*D. erythrocephala*, Fabricius, Spec. Ins., Vol. 1, p. 342 (1781). *Blatta capensis*, Thunberg, Diss. Ent. Nov. Spec. Ins., Vol. 4, p. 77 (1784). *Euryzosteria delalandii*, Saussure, Rev. Zool. (2), Vol. 16, p. 316 (1864). ? *Perisphaeria verticalis*, Burmeister, Handb. Ent., Vol. 2, p. 486 (1838).	S. Africa.
.	*D. gracilis*, Burmeister, ibidem, p. 500 (1838).	S. Africa.
	D. wahlbergi, Stål, Oefv. Vet.-Akad. Förh., Vol. 13, p. 167 (1856). *Deropeltis atra*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 244 (1865).	S. Africa.
4.	*D. intermedia*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 244 (1865).	Natal.
5.	*D. burmeisteri*, Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 77 (1895).	S. Africa.
	D. péringueyi, Saussure, ibidem, p. 77 (1895).	S. Africa.
	D. morio, Karny, Denkschr. Med.-nat. Ges. Jena, Vol. 13, p. 378, pl. 21, ff. 21, 22 (1908).	S. W. Africa.
8.	*D. paulinoi*, Bolivar, Journ. Sc. Lisboa, Vol. 8, p. 108 (1881); (2), Vol. 1, p. 76 (1889)	S. W. Africa and Angola.
	D. carbonaria, Gerstäcker, Mitt. Ver. Neuvorpomm. u. Rügen, Vol. 14, p. 51 (1883).	West Africa.
	D. robusta, Gerstäcker, ibidem, p. 52 (1883).	Kamerun.
11	*D. bueana*, Karsch, Berl. Ent. Zeitschr., Vol. 37, p. 65 (1892).	Kamerun.
	D. tullbergi, Borg, Bih. Svensk. Akad., Vol. 28, nº 10, p. 16, pl. 2, f. 6 (1904).	Kamerun.
	D. sculpturata, Krauss, Zool. Jahrb. Abt. f. Syst., Vol. 5, p. 651, pl. 45, f. 2 (1891).	San Thomé Isl.
	D. triimpressa, Krauss, ibidem, p. 656, pl. 45, f. 3 (1891).	San Thomé Isl.
	D. dichroa, Gerstäcker, Mitt. Ver. Neuvorpomm. u. Rügen, Vol. 14, p. 50 (1883).	Gold Coast.
16.	*D. gaboonica*, Rehn, Proc. U. S. Nat. Mus., Vol. 27, p. 556 (1904).	Gaboon.
	D. antraniana, Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 78 (1895).	West Africa, Gallaland, German E. Africa.

18. *D. melanophila*, Walker, Cat. Blatt. Brit. Mus. Suppl. p. 146 (1869). E. Africa and Madagascar.
Deropeltis madecassa, Saussure, Soc. Ent. Zurich, Vol. 6, p. 17 (1891); Saussure & Zehntner, in Grandidier, Hist. Nat. Madagascar, Orth. Vol. 1, p. 77, pl. 3, ff. 28, 29 (1895).
Deropeltis spenceri, Brancsik, Jahresh. Ver. Trencsin. Com., Vol. 17-18, p. 245, pl. 7, f. 3 (1894).
19. *D. integerrima*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 245 (1865). — Pl. 2, Fig. 18. E. Africa and Zanzibar.
20. *D. nigrita*, Saussure, Ann. Mus. Stor. Nat. Genova, Vol. 35, p. 80 (1895). Somaliland.
21. *D. barbeyana*, Saussure, ibidem, p. 79 (1895). Somaliland.
22. *D. schweinfurthi*, Saussure, ibidem, p. 79 (1895). Somaliland.
23. *D. dmitrievi*, Adelung, Ann. Mus. Zool. St-Pétersb., Vol. 9, p. 463 (1905). Somaliland.
24. *D. kachovskii*, Adelung, ibidem, Vol. 8, p. 319, pl. 20, f. 6 (1903). Abyssinia.
25. *D. pallidipennis*, Adelung, ibidem, p. 327 (1903). Abyssinia.
26. *D. negus*, Adelung, ibidem, Vol. 9, p. 458 (1905). Abyssinia.
27. *D. erythropeza*, Adelung, ibidem, p. 460 (1905). Abyssinia.
28. *D. adelungi*, Shelford, Sjöstedt's Kilimandjaro-Meru Exped., Blatt. p. 37 (1907). Abyssinia.
Deropeltis gracilis, Adelung, Ann. Mus. Zool. St-Pétersb. Vol. 9, p. 455 (1905).
29. *D. brevipennis*, Shelford, Deutsche Ent. Zeitschr. p. 619 (1909). Erythræa.

26. Genus MIROBLATTA, Shelford

Miroblatta. Shelford, Trans. Ent. Soc. Lond. p. 271 (1906).

Characters. — Pronotum sub-cucullate, anteriorly parabolic, covering vertex of head, posteriorly truncate, exposing the scutellum, disc with elevated ridges. Tegmina and wings not extending beyond the apex of the abdomen. Tegmina very broad, corneous, venation obscured, anal vein absent; mediastinal field on under surface elevated, keeled, the space between mediastinal and radial veins broad, inflexed, forming together with the mediastinal field an epipleuron. Wings broadly ovate, coriaceous, anterior part nearly twice as broad as posterior part, outer margin deeply indented at apex of dividing vein, posterior part not folding in fan-like manner. Genital styles minute. Cerci long, sharply pointed. Legs long, slender; femora unarmed beneath; spines on outer aspect of posterior tibiæ biseriately arranged. Posterior metatarsi longer than remaining joints, unarmed beneath; the pulvilli large, the second occupying the whole length of the joint.

Geograpical distribution of species. — Borneo.

1. *M. petrophila*, Shelford, Trans. Ent. Soc. Lond. p. 272, pl. 14, f. 4, 4*a* (1906). Borneo.

27. Genus CATARA, Walker

Catara. Walker, Cat. Blatt. Brit. Mus. p. 52 (1868).

Characters. — Male with tegmina and wings fully developed; female entirely apterous. Antennæ slightly incrassated. Pronotum rugose; sub-discoidal, anteriorly truncate in the male; sub-cucullate, posteriorly truncate and with the posterior angles produced in the female. Dorsal surface of female rugose, posterior angles of mesonotum produced. Supra-anal lamina of male sub-transverse; genital styles small. Cerci short, obtuse. Femora almost entirely unarmed. Tibial spines small and few in number, biseriately arranged on the outer aspect of the tibiæ. Tarsi unarmed beneath; posterior

metatarsus equal in length to the remaining joints, its pulvillus apical, the remaining pulvilli large. Arolia small.

Geographical distribution of species. — Singapore, Java, Borneo.

1. *C. rugosicollis*, Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 245 (1865). — **Pl. 2, Fig. 19.** Singapore, Borneo.
   Catara rugicollis, Walker, Cat. Blatt. Brit. Mus. p. 53 (1868).
   Archiblatta valvularia, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 23, p. 118, pl. 10, f. 40 (1873).
2. *C. minor*, Krauss, Denkschr. Med.-nat. Ges. Jena, Vol. 8, p. 753 pl. 67, f. 3 (1903). Java.

28. Genus PROTAGONISTA, Shelford

Protagonista. Shelford, Ann. Mag. Nat. Hist. (8), Vol. 1, p. 158 (1908).

Characters. — Antennæ slightly incrassated. Eyes further apart than antennal sockets. True ocelli present. Pronotum almost rectangular, as long as broad, sides not deflexed, not covering vertex of head. Pronotum and tegmina with a fine erect pubescence. Tegmina and wings fully developed in the male (female unknown), exceeding the apex of the abdomen. Genital styles present. Cerci moderate. Legs slender; front femora with a complete row of spines on anterior margin beneath, none on posterior margin; mid and hind femora with only one spine on each margin. Spines on posterior tibiæ on outer aspect biseriately arranged. Posterior metatarsi very long, considerably exceeding the remaining joints in length; all the pulvilli apical; arolia minute.

Geographical distribution of species. — Tonkin.

1. *P. lugubris*, Shelford, Ann. Mag. Nat. Hist. (8), Vol. 1, p. 158, pl. 9, f. 1 (1908). Tonkin.

29. Genus ARCHIBLATTA, Vollenhoven

Archiblatta. Vollenhoven, Tijdschr. v. Ent., Vol. 5, p. 106 (1862); Brunner von Wattenwyl, Nouv. Syst. des Blatt. p. 248 (1865).

Planetica. Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 164 (1864).

Characters. — Sexes dissimilar. Antennæ elongate. Pronotum slightly longer than broad, trapezoidal, anteriorly emarginate, not covering vertex of head, disc rugose. Male with fully-developed tegmina and wings considerably exceeding apex of abdomen. Tegmina with long anal field; mediastinal area deflexed. Wings with posterior part not broader than anterior part, outer margin deeply indented at apex of dividing vein. Female entirely apterous, with the abdomen ample. Genital styles small. Cerci moderate. Femora unarmed beneath. Tibiæ very sparsely armed, the spines arranged on the outer aspect in a single row. Posterior metatarsus shorter than the succeeding joint, unarmed beneath; all the pulvilli large.

Geographical distribution of species. — Singapore, Penang, Great Sunda Islands.

1. *A. hoevenii*, Vollenhoven, Tijdschr. v. Ent., Vol. 5, p. 106, pl. 6, ff. 1, 2 (1862). Penang, Singapore and Great Sunda Isl.
   Planetica aranea, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, Vol. 17, p. 166, pl. 1, f. 23 (1864).
2. *A. phalangium*, Saussure, Rev. Zool (2), Vol. 16, p. 344 (1864). « India orientalis ».

Doubtful species :

3. *A. parva*, Shelford, Ann. Mag. Nat. Hist. (8), Vol. 1, p. 160 (1908). West Australia.

30. Genus NOCTICOLA, Bolivar

Nocticola. Bolivar, Ann. Soc. Ent. Fr., Vol. 61, p. 29 (1892).

Characters. — Size small. Eyes simple or absent. Antennæ very long. Third joint of palpi with obtuse apex. Pronotum more or less truncate anteriorly and posteriorly. Tegmina (♂) ovate, not exceeding the fourth abdominal tergite, corneous, ciliate; wings rudimentary. Tegmina and wings (♀) absent. Tibiæ scarcely longer than the femora, sparsely spined, the spines biseriately arranged. Tarsi very long, without pulvilli or arolia. Supra-anal lamina (♂ and ♀) triangular. Sub-genital lamina : (♂) with the apex emarginate, styles absent (?), (♀) large, compressed at the apex, divided by a longitudinal groove.

Geographical distribution of species. — Philippines.

1. *N. simoni*, Bolivar, Ann. Soc. Ent. Fr., Vol. 61, p. 32, pl. 1 (1892). Philippines.
2. *N. caeca*, Bolivar, ibidem, p. 33 (1892). Philippines.

31. Genus SPELÆOBLATTA, Bolivar

Spelæoblatta. Bolivar, Ann. Mus. Stor. Nat. Genova, Vol. 38, p. 32 (1897).

Characters. — Size small. Head oblong, elongate. Eyes absent. Antennæ very long. Last joint of maxillary palpi incrassate towards the apex, which is truncate. Pronotum anteriorly arcuate, posteriorly truncate. Tegmina (♀) squamiform, obliquely truncate; wings absent. Tibiæ strongly spined, the spines biseriately arranged on the outer aspect. Tarsi very long, pulvilli and arolia absent. Supra-anal lamina (♀) triangular, apex rounded. Sub-genital lamina valvular. Cerci elongate, imperfectly articulate, pointed at the apex.

Geographical distribution of species. — Burma.

1. *S. gestroi*, Bolivar, Ann. Mus. Stor. Nat. Genova, Vol. 38, p. 32 (1897). Burma.

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— 2*a*. — *patula*, Walker. Apex of abdomen, ♀, dorsal view.
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— 18. *Deropeltis integerrima*, Brunner von Wattenwyl, ♀.
— 19. *Catara rugosicollis*, Walker, ♀.

Oxford, July 15, 1910.

Polyzosteria cuprea

Platyzosteria ferax

Eurzosteria mitchellii

Platyzosteria coolgardiensis

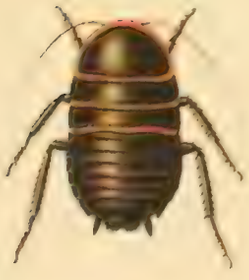
Platyzosteria semivitta

Polyzosteria nubescens

Platyzosteria bicolor

Platyzosteria melanaria

Eurzosteria patula

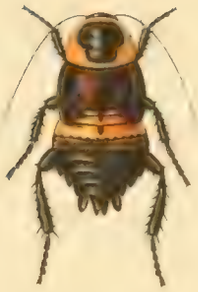


FAM. BLATTIDÆ.

SUBFAM. BLATTINÆ.

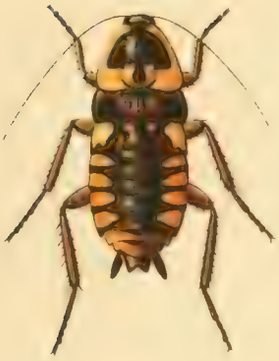
Scabina antipoda

Methana marginalis

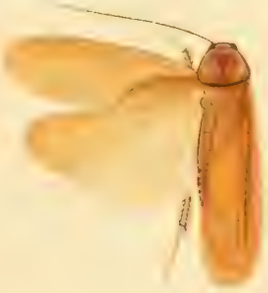


Paramethana buyssoni

Eurycotis floridana



Stylopyga ornata



Pseudoderopeltis flavescens.

Pelmatosilpha purpurascens

Periplaneta lata.

Homalosilpha vicina

Deropeltis integerrima

Catara rugosicollis

FAM. BLATTIDÆ

SUBFAM. BLATTINÆ (=PERIPLANETINÆ)

17. ORTHOPTERA.

2. Blattodea

by

R. SHELFORD.

With 2 plates.

The number of species of *Blattodea* previously recorded from the region traversed by Dr. YNGVE SJÖSTEDT's expedition is quite insignificant. GERSTÆCKER described in 1869 the collection of insects made by Baron C. C. VON DER DECKEN in the Kilimandjaro district, but scarcely more than a dozen of these were cockroaches. A few species from Mombasa and adjacent localities on the East African coast have been described from time to time by various authors, but in the absence of really representative collections no general review of the East African Blattid fauna has been possible, as in the case of South Africa, Abyssinia, Madagascar, the Cameroons and Angola. This group of insects is usually much neglected by collectors, but this reproach cannot be laid to Dr. SJÖSTEDT's charge, for his collection is a very considerable one, including fifty-one species — about 677 specimens — many of which are represented by long series of individuals of both sexes; in fact the collection may be safely regarded as thoroughly representative of the region in which it was made. The species are referable to 29 genera, four of which are new to science, and of the 51 species, 26 or more than half, are new. In the following account of the collection the species are enumerated and described, species recorded by other authors from the same region — which may be conveniently defined as lying between the equator and 5° S. and between the 35th and 40th parallels of longitude — are also noted and finally an analysis of this Blattid fauna and its comparison with the corresponding faunas of other regions of Africa is attempted.

Fam. **Ectobiidæ.**

Gen. **Theganopteryx** Rr.

Theganopteryx africana Sauss.

Ectobia africana Saussure, Abh. Senckenb. Ges. vol. 21 p. 569 (1899).

Kilimandjaro: Kibonoto 1000—1300 metres (April); Lower *Meru:* Masai steppes; *Usambara:* Mombo (June); 9 ♂♂, 4 ♀♀.

Previously recorded from the East African coast (Voeltzkow); the species superficially resembles very closely *Ectobius perspicillaris* Herbst, but structurally differs in the separation of the radial and ulnar veins of the tegmina; since this is the very character used to divide the genus *Theganopteryx* from the genus *Ectobius* the placing of the species in the latter genus is quite illogical.

Theganopteryx saussurei Shelf.

Theganopteryx saussurei Shelford, Gen. Insect. Fasc. 55. p. 8 (1907).
Theganopteryx senegalensis var. Saussure, Ann. Mus. Civ. Gen. Vol. 35 p. 3 (1895).

Kilimandjaro: Kibonoto 1300—1900 metres; Lower *Meru:* Masai steppes. 8 ♂♂.

The species is undoubtedly very closely allied to the West African *senegalensis* Sauss. and may possibly be shown later to be identical; at present however I consider it advisable to separate them.

The two East African species may be separated by their colouration.

1. Testaceous, with scattered fuscous points *africana* Sauss.
1'. Fuscous, pronotum & tegmina margined with white *saussurei* Shelf.

Gen. **Mallotoblatta** Saussure & Zehntner.

Mallotoblatta kraussi Adel.

(Plate 3. fig. 3.)

Mallotoblatta Kraussi Adelung, Ann. Mus. Acad. Imp. des Sci. S:t Petersburg vol. IX p. 12 (1905).

Flavo-testaceous. Body with a sparse erect pubescence most marked on the ventral surface. A transverse band on the frons, the apex of the maxillary palpi and the labrum fuscous. Vertex of head not covered by pronotom. Pronotum trapezoidal, with two longitudinal fuscous vittae. Tegmina equal to the body in length, 15 costal veins, radial vein bifurcate, 7 longitudinal discoidal sectors, posterior ulnar simple. Wings shorter than the tegmina, mediastinal vein 5-ramose, 9—10 costals, these and the mediastinal rami incrassated, radial vein bifurcate near apex, median vein sinuate, ulnar vein bifurcate near apex, medio-discal and medio-ulnar areas

crossed by transverse nervules, a small triangular apical field. 7th abdominal tergite depressed, its posterior border emarginate, the scent-glands opening at the bottom of the depression, 8th tergite widely emarginate posteriorly, 9th tergite exposed. Supra-anal lamina large, quadrate, posterior angles acute. Cerci elongate. Sub-genital lamina asymmetrical, produced. Front femora with several spines on the anterior margin beneath, the distal ones minute, formula of apical spines $\frac{2}{1}$, $\frac{1}{1}$, $\frac{1}{1}$, no genicular spines on the front femora.

Length of body 12 mm; length of tegmina 9,5 mm, pronotum 3mm × 3,9 mm.

Meru: Rain forest 3000 m, 1 ♀ (January).

I belive this to be the male of ADELUNG's species described from Abyssinia from a female only. Dr. ADELUNG was not quite certain if this species and *brachyptera* ADEL. also described from a female, were rightly referable to the genus *Mallotoblatta*. The male of *kraussi* certainly does not conform quite strictly to the generic type as represented by *M. pubescens* SAUSS. and ZEHNT., and *M. pilosella* SAUSS. and ZEHNT. from Madagascar, for the pronotum is not »chiffonée», the supra-anal plate is produced and quadrate instead of transverse, the form of the dorsal abdominal tergites and scent-gland opening is different and the front-femora are armed according to the type *A* of SAUSSURE instead of according to type *B*. Nevertheless in the erect pubescence, and in the venation of tegmina and wings *M. kraussi* shows such close affinities to the Mascarene species that for the present it may be allowed a resting-place in the same genus. The discovery of the females of the Mascarene species may occasion the erection of a new genus for the continental forms in which sexual dimorphism is a leading characteristic.

Gen. **Hololampra** SAUSS.

Two species of this characteristically Palaearctic genus occur in the Kilimandjaro region, one species only is represented by both sexes and the male of this differs from those of all the other representatives of the genus by the length of the wings. The females of the two species may be distinguished as follows:

1. Testaceous, tegmina and pronotum with brown points . *sjöstedti* n. sp.
1'. Abdomen and head piceous . . . . . *aethiopica* n. sp.

Hololampra æthiopica n. sp.

(Plate 2, Fig. 1.)

♂. Piceous. Antennae fuscous. Pronotum trapezoidal, margins broadly hyaline, disc with scattered brown points or with dark castaneous blotches symmetrically arranged. Scutellum exposed. Tegmina equal to the body in length, clear testaceous with scatted castaneous points on the veins and minute brown maculations between the veins; 9—10 constal veins, 5—6 oblique discoidal sectors, anal vein impressed. Wings abbreviated, reaching the 6th abdominal tergite, hyaline veins infuscated,

5—6 rudimentary costal veins, distal half of median vein alone visible, medio-discal area crossed by transverse nervules, ulnar vein simple 1st axillary triramose. Abdomen above with the first 6 abdominal tergites piceous, the remainder flavo-testaceous, the posterior borders of 6th—8th tergites emarginate, opening of scent-glands on 7th tergite, supra-anal lamina transverse, slightly produced. Cerci fuscous, 7 jointed. Abdomen beneath piceous, laterally margined with testaceous; sub-genital lamina irregular, elongate.

Femora castaneous, sparsely armed beneath, no genicular spines on the middle pair; tibiae and basal joint of tarsi flavo-testaceous, apical joints of tarsi fuscous.

♀. Larger; variable in colour, pronotum with brown points or heavily blotched with castaneous. Tegmina extending to 1st or 2nd abdominal tergite. Wings rudimentary. Abdomen piceous above, with the tergites margined with flavo-testaceous, or with flavo-testaceous spots only on their lateral margins; supra-anal lamina short, transverse; abdomen beneath piceous, laterally margined with testaceous, sub-genital lamina ample. Cerci piceous. Legs as in .

Larvae have all the thoracic tergites testaceous variegated with castaneous, the abdomen piceous; the legs are entirely castaneous.

♂. Total length 6 mm, length of tegmina 5,9 mm; pronotum 2 mm × 3 mm.
♀. » » 7,1 » » » » 3 » » 2,2 » × 3,2 »

Kilimandjaro: Rain forest, Kiboscho, 3000 m (February), 2 ♂♂, 6 ♀♀, 5 larvae.

Hololampra sjöstedti n. sp.

♀. Testaceous. Head rufo-testaceous, vertex covered. Pronotum trapezoidal, sides deflexed, lateral margins broadly hyaline, posterior border truncate, exposing the scutellum. Tegmina lanceolate, attaining the sixth abdominal segment, overlapping slightly, 8 costal veins, one ulnar vein with 5 branches, anal vein impressed, reaching the sutural margin at one half of its length; a few brown points occur on the veins. Wings rudimentary. Abdomen above variegated with fuscous, supra-anal lamina short transverse; abdomen beneath variegated with fuscous, disc fuscous, sub-genital lamina ample, its centre rufo-testaceous or castaneous; cerci six-jointed, rufo-testaceous. All the femora with two spines only on the anterior margin beneath, none on the posterior margin, with genicular spines and two apical spines.

Total length 6,5 mm; length of tegmina 4 mm; pronotum 2 mm × 3 mm.

Kilimandjaro: Kibonoto, zone of culture 1000—1900 m (August to December).

Lower *Meru:* Ngare na nyuki (January); Masai steppes (October). 22 ♀♀, 2 larvae. One example has the ootheca projecting from the end of the abdomen; it is chitinous and carried with the suture uppermost, it is not carinate.

The species appears to be nearest to *H. minuta* Shelf. from Madagascar.

Fam. **Phyllodromiidæ.**

Gen. **Ischnoptera** Burm.

The East African species can readily be distinguished from species of *Phyllodromina*, not only by the wing venation but also by the longitudinal, instead of oblique, discoidal sectors of the tegmina and by the asymmetry of the sub-genital lamina and styles in the male sex. The following table will assist in the determination of the known species:

1. Testaceous or rufo-testaceous species.
   2. Scent-glands of ♂ opening at base of supra-anal lamina, which is not much produced . . . . . *bimaculata* Gerst.
   2'. Scent-glands of ♂, not as above, supra-anal lamina produced *strigosa* Schaum.
1'. Rufo-castaneous or rufo-fulvous species.
   2. Small . . . . . *neutra* Sauss.
   2'. Larger . . . . . *incuriosa* Sauss.

I. strigosa Schaum. is recorded from Mosambique, it cannot be recognized with certainty. *I. neutra* Sauss. from »Africa meridionalis» is described from a female only and appears to differ in size only from *I. incuriosa* Sauss.

Ischnoptera bimaculata Gerst.

(Pl. 3, figs. 10 & 15.)

Phyllodromia bimaculata Gerstaecker, Arch. Naturg. XXXV. p. 206 (1869); Von der Decken, Reisen in Ost-Afrika III (2) p. 4 (1873).

Gerstaecker's description does not include an account of the wing structure in this species; the venation is somewhat variable but at least two branches of the ulnar vein fail to reach the outer margin of the wing and are directed towards the dividing vein. On account of this character the species must be placed in the genus *Ischnoptera*. The 8th abdominal tergite in the male is completely hidden beneath the 7th tergite, the 9th tergite is also invisible and the base of the supra-anal lamina is depressed forming a cavity fringed with hairs, the scent glands open on the sides of two chitinous tubercles in this cavity. The sub-genital lamina is very irregular and notched on the left side, a style being situated in the notch, the right style is stouter and spinose, the apex of the lamina forms a hirsute lobe. Ootheca as in *Phyllodromia germanica* L.

Kilimandjaro: Kibonoto, lower slopes and 1300—1900 metres, under dead leaves in banana plantations. 21 ♂♂, 25 ♀♀. The species was originally recorded from Lake Jipe at Kilimandjaro (von der Decken).

Var. **sobrina** nov.

♂ and ♀. Castaneous, margins of pronotum hyaline its disc castaneous. Wings with veins fuscous.

1 ♂, 21 ♀♀ and numerous larvae. From the same localities as the typical form and also from Usambara. Structurally these two forms are identical and of similar size.

Ischnoptera incuriosa SAUSS.

(Pl. 3, figs. 6 & 7.)

Ischnoptera incuriosa DE SAUSSURE, Abh. Senckenb. Ges. XXI. p. 571 (1899).

Kilimandjaro: Kibonoto 1000—1300 metres (November and December), 2 ♂♂. Originally described from East-African e coll. VOELTZKOW.

Gen. **Phyllodromia** SERV.

Key to the East-African species.

1. ulnar vein of wings simple or bifurcate . . . . . *germanica* L.
1'. ulnar vein of wings multiramose.
  2. pronotum with two longitudinal fuscous vittae . . . *bivittata* SERV.
  2'. pronotum not as above.
    3. tegmina with numerous castaneous points . . . . *zehntneri* nom. n.
    3'. tegmina not as above.
      4. Opening of ♂ scent-glands situated on 7th abdominal tergite.
        5. Sub-genital lamina in ♂ with margins inflected, styles flattened . . . . . *supellectilium* SERV.
        5'. Sub-genital lamina in ♂ not as above, styles not flattened.
          6. Frons flattened . . . . . *nigromarginata* sp. n.
          6'. Frons rounded . . . . . *sjöstedti* n. sp.
      4'. Opening of ♂ scent-glands not situated on 7th abdominal tergite.
        5. Opening of ♂ scent-glands not visible . . . *insignis* sp. n.
        5'. Opening of ♂ scent-glands situated on supra-anal lamina. . . . . *testacea* sp. n.

P. trigonalis SAUSSURE from »Africa meridionalis» (VOELTZKOW) was described from a female; the rufous colour, trigonal supra-anal lamina, and front femora with completely armed anterior margin beneath, appear to be the distinctive features of the species.

Phyllodromia germanica L.

Blatta germanica, LINNÆUS Syst. Nat. (ed. 12) I (2) p. 668 n. 7 (1767).

Kilimandjaro: Kibonoto, 1000—1300 metres; *Meru* rain-forest; Massai steppes (January & May). 1 ♂, 7 ♀♀, 2 larvae. A cosmopolitan species.

Phyllodromia bivittata SERV. ist not represented in Dr SJÖSTEDT's collection but has been recorded from Wanga (VON DER DECKEN); it is a cosmopolitan species and

can be distinguished from *P. germanica* L., by the castaneous stripe on the tegmina, the ramose ulnar vein of the wings, the notched supra-anal lamina of the male and transverse supra-anal lamina of the female and by the produced, and laterally compressed sub-genital lamina of the male, with finely cleft apex.

Phyllodromia supellectilium Serv.

(Pl. 3, fig. 11.)

Blatta supellectilium Serville, Hist. Ins. Orth. p. 114 (1839).
Blatta extenuata Walker, Cat. Blatt. Brit. Mus. p. 221 (1868).
Blatta figurata Walker, Cat. Derm. Salt. Brit. Mus. V. Suppl. Blatt. p. 24 (1871).
Blatta transversalis Walker, Cat. Derm. Salt. Brit. Mus. V. Suppl. Blatt. p. 25 (1871).
Phyllodromia delta Kirby, Ann. Mag. Nat. Hist. (7) V. p. 280 (1900).

Kilimandjaro: Kibonoto 1000—1300 metres; Massai steppes. Lower *Meru*. *Usambara:* Mombo. 5 ♂♂. A cosmopolitan species, which is very variable in size; it can however always be recognized by the form of the sub-genital plate of the male. The lateral margins of this are inflected and the two styles are flattened. The supra-anal lamina is almost hidden by the ninth tergite; in the centre of the seventh tergite is a circular depression from which rises a bifurcate chitinous structure covered with a fine pubescence and the scent-glands open on either side of this.

Dr. Sjöstedt's specimens have been compared with three examples in the Oxford Museum determined by Serville himself and though the Kilimandjaro specimens are larger and darker than Serville's specimens (= *P. delta* Kirby), I have no hesitation in referring them to *supellectilium* on account of the identity of structure. The female of *P. supellectilim* is very different from the male and this sexual dimorphism is a character that perhaps entitles this species to generic rank separate from *Phyllodromia*.

Phyllodromia zehntneri nom. nov.

Theganopteryx (*Pseudectobia*) *punctulata* de Saussure & Zehntner, Grandidier. Hist. Madagasc. Orth. I p. 15 (1895).

Usambara: Tanga (June). 1 ♀.

I now think that I was wrong in referring this species tho the genus *Theganopteryx*, sens. strict. (cf. Ann. Mag. Nat. Hist. (7) XIX. p. 36. 1907); the ulnar vein of the wing is described as »bi-ramose» not as »bifurcate» and its branches vary in number from three to four. The species also can not be referred to the genus *Pseudectobia* as defined by me (l. c.) but appears to fall quite naturally into the genus *Phyllodromia*. Unfortunately it is necessary to find a new specific name for it, since *punctulata* has already been applied to two species of *Phyllodromia*, viz. *P. punctulata* Beauvois (1805) and *P. punctulata* Brunner (1893), for the latter species the name *brunneri* is suggested. *P. zehntneri* was previously recorded from Madagascar.

Phyllodromia nigromarginata sp. n.

(Pl. 3, fig. 12.)

♂. Testaceous. Head castaneous, vertex not covered by pronotum flattened, antennae testaceous. Pronotum transversely elliptical, variegated with castaneous,

with two oblique sulci on disc, lateral margins hyaline. Tegmina testaceous, 10 to 11 costals, the last 3 ramose, anterior ulnar sending 5 oblique branches to the sutural margin and 2 ramose branches to the apical margin, posterior ulnar simple. Wings hyaline, mediastinal vein unbranched, 10 costals, their apices incrassated, ulnar vein with 5 branches. Abdomen above with the disc testaceous with a central piceous blotch, margins castaneous, the last 4 tergites piceous; the scent-glands open on the 7th tergite by two orifices, a papilla covered with fine setae placed between the openings; 9th tergite concealed; supra-anal lamina trigonal. Abdomen beneath rufo-testaceous broadly margined with dark castaneous; sub-genital lamina produced, no styles; cerci fuscous. Legs testaceous, front femora armed on the anterior margin beneath with a complete row of spines, the proximal spines being the longer; each femur with 1 genicular and 2 apical spines.

Total length 16 mm; length of body 11,2 mm; length of tegmina 14 mm; pronotum 2,9 mm × 4,2 mm.

Lower *Meru:* Ngare na nyuki. *Kilimandjaro:* Kibonoto 1000—1900 metres, 6 .

Phyllodromia sjöstedti sp. n.

. Closely allied to the preceding species but smaller. Rufo-testaceous. Head castaneous, vertex rounded, not covered by pronotum; antennae infuscated, testaceous at base. Pronotum transversely elliptical, disc castaneous with a rufo-testaceous macula on the posterior part, lateral margins broadly hyaline. Tegmina rufo-castaneous 11 costals, the last two ramose, anterior ulnar sending ramose branches to sutural and apical margins. Wings hyaline, suffused with rufo-testaceous on anterior margin, mediastinal vein simple, 9 costals the first 6 incrassated, ulnar vein with 5 branches. Abdomen above castaneous, scent-glands as in preceding species, supra-anal lamina shortly trigonal; abdomen beneath castaneous with the disc rufo-testaceous, sub-genital lamina ample, produced, slightly pubescent, with two styles; cerci elongate, fuscous. Legs testaceous, front femora armed beneath on anterior margin with a complete row of spines, of which the more distal are the longer; formula of apical spines $\frac{1}{1}, \frac{1}{1}, \frac{1}{1}$.

Total length 14 mm; length of body 10,6 mm; length of tegmina 11,8 mm; pronotum 3 mm × 4,2 mm.

Lower *Meru* (November), 1 ♂.

Phyllodromia insignis sp. n.

(Pl. 3, fig. 8.)

♂. Castaneous. Antennae fuscous. Vertex of head not covered by pronotum. Pronotum transversely elliptical, lateral margins broadly hyaline, disc with some obscure impressions. Tegmina with costal margin to near apex hyaline, remainder of tegmina not uniformly castaneous but internervular spaces crossed by numerous minute hyaline streaks arranged more or less regularly; 9 costal veins, radial bifurcate and sending branches both to costal margin and to apex, anterior ulnar with 6 oblique branches, posterior ulnar simple. Wings infuscated, mediastinal vein with 2 branches, 8 costals, their apices incrassated, ulnar vein tri-ramose, the branches bifurcate.

Abdomen with the disc above testaceous; supra-anal lamina transverse; sub-genital lamina cucullate, deeply notched, the flattened styles springing from the borders of the notch; cerci elongate, fuscous. Legs testaceous, front femora armed with piliform setae only on the anterior margin beneath.

Total length 12 mm; length of tegmina 9,5 mm; pronotum 3 mm × 3,9 mm.

Kilimandjaro: Kibonoto 1000—1300 metres (Sept.), 1 ♂.

Phyllodromia testacea sp. n.

(Pl. 2, fig. 14.)

♂. Pale testaceous. Head rufo-testaceous, vertex not covered by pronotum. Pronotum transversely elliptical, lateral margins broadly hyaline. Tegmina with marginal area very broad, 9 costal veins, the last ramose, anterior ulnar sending 5 branches to sutural and apical margins, the latter ramose; numerous transverse venulae between the veins. Wings hyaline, mediastinal vein bifurcate, the lower branch bi-ramose, 6 costal veins their apices not incrassated, end of radial vein ramose, ulnar vein with 4 branches. Abdomen rufo-testaceous towards apex, supra-anal lamina transverse, posteriorly incrassated, a depression occurs in the posterior edge on either side of the middle line and at the base of these the scent-glands open. Sub-genital lamina produced considerably beyond the supra-anal lamina, cucullate at apex which is deeply and narrowly cleft, the flattened styles spring from the posterior margin; cerci long, testaceous. Front femora with piliform setae only on the anterior margin beneath; all the femora with genicular spines; formula of apical spines $\frac{2}{1}$, $\frac{1}{1}$, $\frac{1}{1}$.

Total length 14 mm; length of body 11 mm; length of tegmina 12 mm; pronotum 3,6 mm × 5 mm.

Usambara: Tanga (June), 1 ♂.

The nearest allies of this species appear to be *P. laterifera* Wlk., *P. propinqua* Wlk, *P. majuscula* Wlk. from the Indo-Malayan and Indo-Australian regions of the world. The remarkable form of the supra-anal lamina of *P. testacea* is however a sufficiently distinctive character and should render it easier of identification than is the case with so many of the obscure species of this large genus.

Gen. **Ceratinoptera** Brunner.

This genus should be reserved for those species of Phyllodromiinae characterized by short or reduced tegmina and short or rudimentary wings, the tegmina when reduced are lanceolate, not truncate nor lobiform, and the wings when present have the ulnar vein bifurcate or simple. In the genus *Allacta* the wings are well-developed but the ulnar vein is ramose, the median is sometimes absent. The genus *Temnopteryx* is characterized — as its name signifies — by the truncate tegmina and rudimentary wings.

The African species of *Ceratinoptera* may be distinguished as follows:

1. Castaneous species.
   2. Tegmina not banded nor variegated with paler colour.
      3. Pronotum not pale-bordered anteriorly.
         4. Tegmina much shorter than the body.
            5. Sub-genital lamina of ♂ posteriorly truncate, angles acute . *abbreviata* Sauss. (Réunion).
            5'. Sub-genital lamina of ♂ posteriorly rounded . . . . . *castanea* sp. n. (E. Africa).
         4'. Tegmina not or scarcely shorter than the body.
            5. Larger, legs testaceous . . . *madecassa* Sauss. (Madagascar).
            5'. Smaller legs castaneous . . . *ovata* sp. n. (E. Africa).
      3'. Pronotum pale-bordered anteriorly . *abyssinica* Sauss. (Abyssinia).
   2'. Tegmina banded or variegated with paler colour.
      3. Pronotum with disc rufous.
         4. Minute species . . . . . *perpulchra* sp. n. (E. Africa).
         4'. Larger . . . . . *dimidiata* Gerst. (E. Africa).
      3'. Pronotum with disc not rufous.
         4. Disc of pronotum with testaceous maculae . . . . . *variegata* Schulth (E. Africa)
            = *hottentota* Sauss. (Delagoa Bay)
            transvaaliensis Kirby (Transvaal).
         4'. Disc of pronotum concolorous . . *bolivari* Adel. (Gallaland).
1'. Testaceous of ferruginous species.
   2. Pronotum with fuscous markings on disc.
      3. Markings on disc of pronotum numerous . . . . . *inscripta* Wlk. (Natal).
      3'. Markings on disc reduced to two obsolescent vittae . . . . . *bimaculata* sp. n. (E. Africa).
   2'. Pronotum without markings on disc.
      3. Supra-anal lamina of ♂ transverse . *ferruginea* Schulth (S., W. & E. Africa).
      3'. Supra-anal lamina of ♂ produced.
         4. Opening of scent-glands at base of supra-anal lamina . . . . . *variabilis* sp. n. (E. Africa).
         4'. Opening of scent-glands on 7th abdominal tergite . . . . . *sjöstedti* sp. n. (E. Africa).

Blatta misella Stål from Natal is a species of *Hololampra*.

Ceratinoptera bimaculata sp. n.

♀. Testaceous, broad, short. Frons with a castaneous band; apical joint of maxillary palpi and antennae except at base, fuscous. Vertex of head almost covered by the pronotum. Pronotum large, trapezoidal, lateral margins broadly, posterior margin narrowly hyaline, posterior border slightly obtusely angled, scutellum not exposed; two obsolescent castaneous vittae on the disc. Tegmina longer than the body, testaceo-hyaline, membranous, 10 costal veins, ulnar, anal and axillary veins obsolescent. Wings abbreviated, extending to the 2nd abdominal tergite. Abdomen above castaneous, laterally margined with testaceous; supra-anal lamina testaceous, small, triangular. Abdomen beneath testaceous, with lateral fuscous maculae obsolescent posteriorly; sub-genital lamina very large, semiorbicular. Legs testaceous, front femora with a complete row of long spines on the anterior margin beneath.

Total length 9,1 mm; length of body 8 mm; length of tegmina 6,1 mm; pronotum 3 mm × 4 mm.

Usambara: Mombo (June), 2 ♀♀.

The broad abdomen and the obsolescent venation of the membranous tegmina are the characteristic features of this species. Obsolescent venation is usually associated with a corneous and more or less opaque texture of the tegmina, its disappearance from delicate membranous tegmina is most unusual.

Ceratinoptera castanea sp. n.

♂. Allied to *C. abbreviata* Sauss. and *C. madecassa* Sauss. but differing from the former by its larger size and by the different shape of the sub-genital lamina and from the latter by the shorter tegmina.

Dark castaneous. Antennae fuscous, month parts testaceous. Pronotum trapezoidal, nearly covering vertex of head lateral margins rufo-castaneous, its posterior margin slightly obtusely angled. Tegmina lanceolate, corneous, extending to the 4th abdominal tergite, 10 costals, anal vein impressed, remainder of venation obscured. Wings much reduced, extending to middle of 2nd abdominal tergite. Supra-anal lamina transverse, slightly produced. Sub-genital lamina broad, transverse, slightly produced, its posterior angles rounded, with two short styles. Legs rufo-testaceous.

Length of body 12 mm; length of tegmina 7 mm; pronotum 4 mm × 5 mm.

Usambara: Mombo (June), 1 ♂.

Ceratinoptera sjöstedti sp. n.

(Pl. 3, figs. 16—17.)

♂. Allied to *C. ferruginea* Schulth but with longer tegmina. Rufo-testaceous. Head castaneous, antennae testaceous at base, remainder infuscated; vertex of head not nearly covered by pronotum. Pronotum transversely elliptical with lateral margins hyaline, posterior border truncate, exposing the scutellum. Tegmina extending to penultimate segment, membranous; marginal field very broad, 12 costal veins, anterior

ulnar with 6 branches, posterior ulnar simple, 5 axillary veins. Wings reduced, attaining 2nd abdominal tergite. Opening of scent-glands a circular orifice on the 7th abdominal tergite. Supra-anal lamina trigonal, posterior border slightly emarginate; sub-genital lamina broad, produced, apex slightly cleft, with two styles asymmetrically placed. Titillator spinous.

Length of body 8,2 mm; length of tegmina 7,5 mm; pronotum 3 mm × 4 mm.

Lower *Meru:* at the river Ngare na nyuki (January), 2 ♂♂.

Ceratinoptera variabilis sp. n.

♂. Rufo-testaceous. Head with a castaneous band between the eyes and two spots between the antennal sockets; antennae testaceous at base; vertex of head not covered by pronotum. Pronotum trapezoidal, sides deflexed, posterior margin obtusely angled, margins hyaline, disc rufo-testaceous or castaneous variegated with rufo-testaceous. Tegmina lanceolate, reaching the 7th segment, mediastinal area hyaline, mediastinal vein bi-ramose, 6 costals the last ramose, discoidal field with 5 longitudinal sectors. Wings minute, extending to 1st abdominal tergite. Abdomen rufo-testaceous variegated with castaneous, 7th tergite cucullate & concealing the 8th & 9th tergites; the scent-glands open at the base of the supra-anal lamina which is concave at its base with a median carina, the opening of the glands is fringed with hairs; supra-anal lamina produced, sub-quadrate, not exceeding the sub-genital lamina which is asymmetrical, terminating at apex in a rounded hirsute lobe and with two unequal styles. Front femora on anterior margin beneath armed with a complete row of spines, the more proximal the longer.

♀. Castaneous. Lateral margins of pronotum hyaline, disc sometimes with two or more testaceous maculae, scutellum exposed. Tegmina abbreviated, obovate, not extending beyond the 4th abdominal tergite, 9 costals, anterior ulnar with 4 oblique branches, posterior ulnar simple, anal vein impressed reaching sutural margin at a point one-third from the apex. Wings extending to third abdominal tergite, apex infuscated, costal veins obsolete, median vein straight prominent, ulnar vein stout, bifurcated at apex, 1st axillary vein 3-ramose, stout, the first branch with 3 short branches at apex. Abdomen piceous above and below; supra-anal lamina triangular; apex emarginate, sub-genital plate ample, semi-orbicular.

♂. Length of body 9,2 mm; length of tegmina 5,2 mm; pronotum 3,1 mm × 4 mm.
♀. » » » 11 mm; » » » 5,5 mm; » 3 mm × 4,2 mm.

Kilimandjaro: Kibonoto 1000—3500 metres (Sept.—Nov.), 4 ♂♂, 3 ♀♀, 8 larvae.

The apex of the abdomen is very similar in construction to that of *Ischnoptera bimaculata* Gerst.

♂. var. **truncata** nov.

Simular to above but tegmina and wings shorter, the former transversely truncate. 1 ♀. Lower Meru.

This low country specimen may, possibly be a distinct species, but in colour and general appearance it resembles so closely the mountain forms that I hesitate to separate it, at any rate until a male from the same habitat is found.

Ceratinoptera perpulchra sp. n.

(Pl. 2, fig. 2; Pl. 3, fig. 13.)

♂. Minute, rufo-testaceous, nitid. Head castaneous, rufous on vertex, basal joints of antennae testaceous, remainder fuscous; vertex covered by pronotum. Pronotum trapezoidal with two longitudinal vittae castaneous. Tegmina coriaceous, just failing to reach end of abdomen, a broad humeral stripe which extends as two narrow lines along the radial and ulnar veins, castaneous; 12 costal veins, anterior ulnar biramose, the remaining veins not visible. Wings rudimentary. Abdomen above rufo-testaceous with lateral margins and a central patch castaneous; scent-glands opening on 7th tergite, at base of two deep depressions; supra-anal lamina produced, rounded; cerci short, rufo-testaceous; abdomen beneath castaneous, sub-genital lamina rufo-testaceous, rounded, produced, styles asymmetrically placed. Legs testaceous, front femora as in preceding species.

♀. Somewhat larger, dark castaneous, the disc of the pronotum and field of tegmina rufous, lateral margins of pronotum and mediastinal field of tegmina pale testaceous; abdomen entirely castaneous, cerci fuscous. Tegmina shorter, wings rudimentary, supra-anal lamina triangular, sub-genital lamina ample, semi-orbicular. Legs testaceous, except the bases of the coxae which are castaneous.

♂. Length of body 5,5 mm.; length of tegmina 4 mm.
♀. » » » 7 mm.; » » » 3,8 mm.

Kilimandjaro: Kibonoto 1,000—1,900 métres (March to May, Sept., Oct.), 5 ♂♂, 5 ♀♀, 1 larva.

This is quite the smallest species of the genus; in colouration it approaches *C. dimidiata* Gerst. but it lacks the transverse band on the tegmina.

Ceratinoptera ovata sp. n.

♀. Convex, castaneous, nitid. Vertex of head not covered by pronotum, antennae piceous. Pronotum trapezoidal, sides deflexed, posterior margin obtusely angled, lateral margins paler than the disc. Tegmina reaching base of supra-anal lamina, mediastinal area testaceous, 14 costals, anal vein impressed, remaining veins obscure, the part of the right tegmen overlapped by the left reticulated. Wings shorter than tegmina, 8 costals, their apices slightly incrassated, the last and apex of radial vein tri-ramose, ulnar vein bifurcated. Abdomen and cerci piceous, supra-anal lamina triangular, sub-genital lamina ample, semi-orbicular. Legs rufous.

Length of body 9 mm.; length of tegmina 6,4 mm.; pronotum 3 mm. × 3,9 mm.

Usambara, 1 ♀.

C. dimidiata Gerst. is probably the nearest ally of the species but it was described from an imperfect specimen so that certainty on this point is impossible.

Ceratinoptera dimidiata GERST. has been recorded from Endara, E. Africa (VON DER DECKEN).

Gen. **Temnopteryx** BRUNNER.

Key to the East African species.

1. Fuscous, pronotum margined with testaceous . . . . . *abyssinica* SAUSS. & ZEHNT.

1'. Rufous or testaceous.

2. Testaceous.

3. Larger, 9 mm. long . . . . . *ectobioides* sp. n.

3'. Smaller, 7 mm. long . . . . . *affinis* sp. n.

2'. Rufo-testaceous or rufous.

3. Pronotum with central testaceous vitta . . . . . *caffra* SAUSS.

3'. Pronotum unicolorous . . . . . *rufa* sp. n.

Temnopteryx abyssinica SAUSS. & ZEHNT.

Temnopteryx abyssinica SAUSSURE & ZEHNTNER, Grandidiers Hist. Madagascar Orth. I p. 51 (1895)[1].
Temnopteryx saussurei BOLIVAR, Ann. Soc. Ent. France, vol. LXVI p. 292 (1897).

Kilimandjaro: Kibonoto 1,000—3,500 métres; Masai steppes.
Lower *Meru* (Sept. to Oct.); 10 ♀♀, 5 larvae.

These specimens differ very slightly in colour from the type, which occurs at Massowa; the posterior border of the pronotum is narrowly testaceous, and not provided with a testaceous macula as in the Abyssinian examples, the cerci are testaceous instead of fuscous, and the supra-anal lamina is fuscous instead of testaceous; with these slight differences excepted, the Kilimandjaro examples appear to be identical with the typical specimens. In one example the egg-mass is protruding from the cloaca, the eggs are enclosed in a thin transparent membrane through which the eyes of the developing embryoes can be distinctly seen; it is probably the case that this species carries the eggs until they are almost ready to hatch out. Another example is stated to have been found with termites, but the association was probably accidental.

Temnopteryx ectobioides sp. n.

(Pl. 2, fig. 12.)

♂. Pale testaceous. Head with a fuscous mark between the eyes and another between the antennal sockets, the area between these two marks, pale pinkish-white and nitid; antennae testaceous at base, remainder fusco-testaceous. Pronotum very broad, transversely truncate behind, just failing to cover vertex of head in front; lateral margins broadly hyaline, disc slightly rugulose with a few brown points and with a short fuscous vitta at each posterior angle. Tegmina quadrate just covering the first abdominal segment, with a few brown points between the veins, anal vein

[1] *Temnopteryx abyssinica* SAUSS. (Mém. Soc. Genève. XXIII p. 93. 1873) having been removed to the genus *Ceratinoptera* (vide antea), this species may be allowed to retain its original name.

not marked. Wings minute. Abdomen variegated with rufous and fuscous, more heavily marked below; cerci testaceous spotted with fuscous; supra-anal lamina triangular, apex notched; sub-genital lamina large, trigonal, a median carina, apex deeply cleft, two symmetrically disposed styles, which are bent downwards at right angles to the plane of the lamina. Legs testaceous; front femora armed on the anterior margin beneath with minute piliform spines; formula of apical spines, ½, ½, ½.

♀. Darker than male. Head similar but with a triangular castaneous spot at base of clypeus. Pronotum with an incomplete fuscous vitta on each side of the disc and continued on the meso- and metanotum; metanotum with a central fuscous vitta. Tegmina as in the male. Abdomen almost entirely dark castaneous variegated with testaceous; cerci fuscous, tipped with testaceous; supra-anal lamina triangular, apex emarginate; sub-genital lamina ample, semi-orbicular, posterior margin triangularly notched.

♂. Length of body 9 mm.; length of tegmina 2,1 mm:; pronotum 2,9 mm. × 4,8 mm.
♀. » » » 9 mm.; » 3 mm. × 4,6 mm.

3 ♂♂, 2 ♀. Lower *Meru* (December).

The nearest allies of the species are *T. nana* Sauss. from Senegal and *T. brachyptera* Bol. from North Africa, from both it may be distinguished by the form of the supra-anal and sub-genital plates.

Temnopteryx affinis sp. n.

♀. Allied to the preceding species, but smaller and entirely pale testaceous with only a few brown points on prothorax and tegmina. Tegmina quadrate, not extending beyond metanotum, mediastinal vein nearly reaching outer posterior angle, 4 costals, anal vein not marked. Abdomen above with four obscure longitudinal fuscous vittae, supra-anal lamina slightly produced, rounded, sub-genital lamina semi-orbicular, ample.

Length of body 7,2 mm.; length of tegmina 2 mm.; pronotum 2 mm. 3,5 mm.
Meru rain-forest, 3,000—3,500 métres; 1 ♀.

Temnopteryx rufa sp. n.

♀. Rufous, nitid. Vertex of head not covered by pronotum; antennae fuscous, except basal joints which are rufous. Pronotum with sides deflexed, posterior margin very slightly angulated. Tegmina truncate, reaching 2nd abdominal segment, mediastinal vein sending two branches to outer margin, 10 costals, marginal field very broad, discoidal field narrow, anal vein nearly reaching apex of tegmina. Wings a little shorter than tegmina. Abdomen rufo-castaneous, supra-anal lamina trigonal produced, cerci castaneous, sub-genital lamina ample. Legs rufo-testaceous, front femora with anterior margin beneath armed throughout with spines, the distal shorter than the proximal; all the femora with genicular spines, formula of apical spines ½, ½, ½.

Total length 13 mm.; length of tegmina 5 mm.; pronotum 4 mm. × 5,2 mm.
Kilimandjaro: Kibonoto 1,300—1,900 métres (November); 1 ♀.

T. phalerata Sss. from S. Africa is perhaps the nearest ally of this species, which however can be distinguished by its smaller size and different colour.

Gen. **Loboptera** Br.

Loboptera nitida sp. n.

♀. Rufo-castaneous. Antennae with basal half testaceous, apical half fuscous. Vertex of head just covered by the pronotum. Pronotum transversely elliptical, posteriorly truncate, lateral margins broadly hyaline; tegmina hyaline, lobiform; lateral margins of metanotum hyaline. Abdomen broad, above castaneous, variegated with testaceous, beneath rufo-testaceous, darker on the sides; penultimate tergite with posterior margin produced in the middle, supra-anal lamina triangular, apex slightly carinate, emarginate, sub-genital lamina ample; cerci rufo-testaceous. Legs testaceous; front femora armed on the anterior margin beneath with piliform spines, formula of apical spines $\frac{2}{1}$, $\frac{1}{1}$, $\frac{1}{1}$, no genicular spine on front femora.

Length of body 8 mm.; length of tegmina 1,6 mm.; pronotum 3,8 mm. × 4 mm.

Usambara: Mombo (Jan. and June), 2 ♀♀.

One of the two specimens is very much darker than the other, being entirely castaneous both above and beneath.

The species recorded by Adelung from Abyssinia, *L. ras* has no arolia between the tarsal claws and therefore falls into the genus *Paraloboptera* Sauss.

Gen. **Apteroblatta** nov.

Allied to *Loboptera* Br. but tegmina entirely absent in both sexes. Eyes rather small, vertex very broad. Supra-anal lamina in both sexes triangular, produced, sub-genital lamina of male slightly produced with two symmetrical styles. Ootheca chitinous, carried with the suture uppermost. Front femora with anterior margin beneath with piliform setae, hind femora heavily armed with spines. Arolia present between tarsal claws.

Apteroblatta perplexa sp. n.

(Pl. 2, fig. 3 and 13.)

♂. Rufo-testaceous. Vertex of head not covered by pronotum. Thoracic tergites variegated with rufo-castaneous. Abdomen above with disc dark castaneous, marginal castaneous spots on tergites 2—6. Cerci castaneous. Abdomen beneath rufo-testaceous; sub-genital lamina with apex cleft. Legs testaceous; all the femora with genicular spines; formula of apical spines $\frac{1}{0}$, $\frac{1}{1}$, $\frac{1}{1}$.

♀. Simular to ♂ but larger. Castaneous markings on thoracic tergites forming a definite pattern. Abdomen above castaneous with a submarginal rufo-testaceous vitta on either side, not extending beyond 6th tergite, terminal tergites castaneous; supra-anal lamina with apex slightly notched. Cerci testaceous. Abdomen beneath rufo-castaneous, sub-genital lamina ample, semi-orbicular. Ootheca as in Loboptera.

♂. Length 6 mm.; pronotum 2 mm. × 2,5 mm.
♀. » 7—8 mm.; » 2,2 mm. × 3,1 mm.

Kilimandjaro: Kiboscho, »Bergwiesen», 3,000 métres. *Meru* rain-forest, 3,500 m. 5 ♂♂ and a large number of ♀♀.

Were it not for the presence in the series, of female specimens with the ootheca protruding from the cloaca, these minute cockroaches might readily be overlooked as larval forms of an unknown species of *Phyllodromia* or *Ischnoptera*. The species from Abyssinia described but not named by Aelung (Ann. Mus. Zool. Acad. Imp. St. Petersbourg vol. IX p. 48, fig. 9 (1904)) may be referred to the genus *Apteroblatta* and named after the distinguished Russian entomologist *Adelungi*.

Fam. **Epilampridæ.**

Gen. **Calolampra** Sauss.

Calolampra aptera Schulth.

Calolampra aptera de Schulthess Schindler, Ann. Mus. Civ. Gen. (2) Vol. XIX p. 169, Pl. II. fig. 2 (1898).

Kilimandjaro: Kibonoto. Lower *Meru:* Ngare na nyuki (November—January). *Usambara:* Tanga. 2 ♂♂, 5 larvae. Previously recorded from Ogaden and Kilimandjaro.

Gen. **Eustegasta** Gerstaecker.

A careful examination of several species of this genus has convinced me that the genus is more naturally placed in the family *Epilampridæ* than in the *Perisphæriidæ*. The femora are armed, though sparsely, beneath, the front femora with three to four spines on the anterior margin, the hind femora with two to three on the anterior margin and one to two on the posterior margin, the mid femora are unarmed or else bear one spine on the anterior margin. The supra-anal lamina of the female is produced and generally the apex is cleft, so that it appears sub-bilobate. The facts that the sexes are alike and that the species are viviparous add a little more support to the view, based on structural features, that *Eustegasta* is out of place in the Perisphæriidæ.

Pronotum and tegmina marked with rufous . . . . *pœcila* Schaum.
Pronotum and tegmina unicolorous . . . . . *obsoleta* Kirby.

Eustegasta obsoleta Kirby.

Eustegasta obsoleta Kirby, Ann. Mag. Nat. Hist. (7) vol. V. p. 287, 1900.

Usambara: Tanga (June). One female. The species has also been recorded from Nyassaland.

Eustegasta pœcila Schaum.

Panchlora pœcila Schaum., Ber. Akad. Berlin p. 777 (1853); Peter's Reise Mossamb., Zool. vol. V. p. 109, pl. 7, f. 2 (1862).

Usambara: Mombo (June). One female. Previously recorded from Mozambique and Nyassaland.

Fam. **Blattidæ.**

The old-world genera of Blattidæ with the posterior metatarsus longer than the remaining joints and the tibial spines in three rows may provisionally be distinguished as follows:

1. Tegmina of ♂ reduced, sometimes very short, wings present or absent; of ♀ reduced, sometimes quadrate, never squamiform.

Blatta L.
Type *orientalis* L.

2. Tegmina and wings of ♂ longer than body, no scent-glands opening on 1st abdominal tergite, mesonotum and metanotum with short backwardly directed processes. Tegmina of ♀ quadrate, wings absent, penultimate tergite not concealed by antepenultimate tergite.

Cartoblatta gen. n.
Type *pulchra* sp. n.

3. Tegmina and wings of ♂ longer than body, scent-gland opening on 1st abdominal tergite, mesonotum and metanotum with long backwardly-directed processes. Tegmina of ♀ squamiform, wings absent, penultimate tergite almost concealed by antepenultimate tergite which is depressed and declivous.

Pseudoderopeltis Krauss.
Type *antennata* Sauss.

4. Tegmina squamiform in both sexes, in ♀ penultimate tergite not concealed by antepenultimate tergite, which is not declivous.

Stylopyga Fisch.
Type *rhombifolia* Stoll.

5. Tegmina and wings longer than the body in both sexes; pronotum trapezoidal, anterior border arcuate, sides deflexed.

Periplaneta Burm.
Type *americana* L.

6. Closely allied to *Periplaneta* but the pronotum elliptical, the anterior border truncate, sides not deflexed.

Homalosilpha Stål.
Type *ustulata* Burm.

It is not easy to separate females of *Stylopyga* from females of *Pseudoderopeltis*, the declivous 6th abdominal tergite almost entirely hiding the 7th tergite is perhaps the most distinctive feature of the latter genus, giving the insects a peculiar truncate

appearance when viewed from the side. It is probable that the genus *Blatta* will have to be further subdivided, *orientalis* L., *concinna* HAAN. and *assiniensis* BOL. to take three examples, do not appear to be congeneric.

Gen. **Paramethana** nov.

Differs from *Dorylaea*[1] STÅL in the size of the second pulvillus of the posterior tarsi which covers the whole second joint, and differs from *Methana* STÅL in the reduction of the tegmina and wings which do not extend beyond the fifth abdominal tergite. Third antennal joint nearly three times as long as the second.

Paramethana robusta sp. n.

(Pl. 2, fig. 7.)

♀. Dark castaneous, nitid, broadly elliptical. Head castaneous, clypeus and mouth-parts rufo-testaceous, eyes less remote than antennal sockets, antennae fuscous, except the two basal joints which are rufo-testaceous; vertex of head not covered by pronotum. Pronotum broad, trapezoidal, sides deflexed, posterior margin sinuate, castaneous with a central rufo-castaneous mark, or rufo-castaneous with darker castaneous marks. Tegmina short and broad, overlapping considerably, semi-corneous, veins well-marked, mediastinal vein bifurcate, 9 costals, the last three ramose, anal vein deeply impressed, reaching sutural margin at a point one-third from apex. Wings a little shorter than tegmina, flavo-hyaline, apex slightly infuscated. Abdomen piceous above, castaneous below, posterior angles of penultimate tergite strongly produced, its posterior margin slightly produced, sinuate; supra-anal lamina produced, triangular, apex emarginate and deeply cleft. Cerci long, subacuminate, of thirteen joints. Legs rufo-castaneous, front femora with a complete row of spines on anterior margin beneath; tibial spines in three rows; posterior metatarsus exceeding remaining joints in length, bi-spinulose beneath, pulvilli of remaining joints large occupying the whole extent of the under surface of the joints. Total length 23 mm.; length of tegmina 13 mm.; pronotum 7 mm. × 10,1 mm.

Lower *Meru* (November); 4 ♀♀.

Gen. **Blatta** L.

Blatta propinqua sp. n.

Allied to *B. flavilatera* SAUSS. but tegmina in both sexes sub-lobiform.

♂. Dark castaneous. Head with clypeus flavid, ocelli not visible, antennae rufo-castaneous. Pronotum with a broad semicircular band of rufous on each lateral

[1] The type of the genus *Dorylaea* is *brunneri* STÅL. a species closely allied to *flavicincta* HAAN; both species are characterized by peculiar maxillary palpi and by the small size of the second pulvillus of the posterior tarsi; these are good generic characters. In Biol. Centr. Amer. Orth. I, p. 69, 1893, de SAUSSURE and ZEHNTNER re-define the genus *Dorylaea* and transfer to it the apterous species *rhombifolia* STOLL. which is certainly not congeneric with *flavicincta* HAAN and *brunneri* STÅL. This procedure is quite unnecessary, *rhombifolia* is a characteristic species of the genus *Stylopyga*, no useful purpose is served by forcing it into a genus that already includes two species marked by different generic characters.

margin. Tegmina nearly as broad as long, extending to middle of metanotum, their sutural margins failing to meet by half the breadth of the tegmen. Wings absent. Abdomen piceous above, 7th tergite slightly produced, its posterior margin sinuate, supra-anal lamina subquadrate, its posterior margin notched; abdomen beneath castaneous at base, piceous at apex, sub-genital lamina broad, extending a little beyond the supra-anal lamina, with two symmetrically disposed styles. Cerci piceous, acuminate. Legs rufous; pulvilli minute, apical.

♀. Resembles ♂ but piceous instead of castaneous. Tegmina relatively shorter and narrower, sub-triangular in shape. Seventh abdominal tergite, more produced; supra-anal lamina produced, cucullate, apex broadly emarginate. Legs darker.

♂. Total length 15 mm.; tegmina 3 mm. × 2,9 mm.; pronotum 5 mm. × 6,1 mm.
♀. » » 18,4 mm.; » 3 mm. × 3 mm.; » 5,1 mm. × 7 »

Kilimandjaro: Kibonoto 1,000—1,300 métres. Lower *Meru:* Masai steppes; 1 ♂, 1 ♀, 4 larvae.

The species closely resembles *Blatta flavilatera* Sauss. but can at once be distinguished by the very reduced tegmina. The variety *castanea* Adel. is probably a distinct species, the male has a prominent scent-gland opening on the 1st abdominal tergite as in the genus *Pseudoderopeltis* Krauss. *B. propinqua* affords a passage from the genus *Blatta* to the genus *Stylopyga* Fisch. *Blatta* at present may be reserved for those species in which the tegmina are not squamiform in both sexes and *Stylopyga* for those species with the tegmina squamiform or absent in both sexes but the discovery of a few more species like *propinqua* would cause this generic distinction to break down.

Gen. **Stylopyga** Fisch.

Stylopyga hottentota Sauss.

Dorylaea hottentota de Saussure, Abhandl. Senckenb. Ges. XXI. p. 578 (1899).

Lower *Meru* (November); 1 ♀.

The species was previously recorded from East Africa e coll. Voeltzkow. The specimen before me differs slightly from de Saussure's description but I believe that it must be referred to that species. There are eight species of *Stylopyga* occurring in Africa which can only be distinguished from one another with great difficulty and I believe that some of the species can be sunk as synonymous with others. The species are:

1.	*S. aethiopica* Sauss.	Gaboon.
2.	*S. manca* Gerst.	Cameroons.
3.	*S. anthracina* Gerst.	Cameroons.
4.	*S. spinulifera* Krauss.	San Thomé, W. Africa.
5.	*S. hottentota* Sauss.	E. Africa.
6.	*S. brancsiki* n. n. (= *S. anthracina* Brancs.)	Zambesi.
7.	*S. senecta* Rehn.	Zululand.
8.	*S. tetra* Wlk.	Natal.

Stylopyga spinulifera Kr. and *senecta* Rehn can be distinguished by the form of the supra-anal lamina from all the other species; it is probable however that *senecta* Rehn is synonymous with *tetra* Wlk.; *anthracina* Gerst. is possibly the male of *manca* Gerst. In *aethiopica* Sauss. the posterior angles of the last four segments are produced to form backwardly projecting teeth and the two last of these are reflected upwards; in *manca* Gerst. the posterior margins of the abdominal tergites are furnished with a row of fine tubercles or plications, but both these characters may be present in both species. Adelung has recorded *manca* Gerst. from Abyssinia with some doubt, the occurrence of West African species of insects in East Africa is not unknown and I should not be surprised to learn that the number of African species of *Stylopyga* could be reduced to two or three widely distributed forms. *S. rhombifolia* Stoll. has been recorded from Wanga, East Africa (von der Decken).

Gen. **Cartoblatta** nov.

♂ allied to *Periplaneta* Burm. but the pronotum transversely elliptical, anterior border truncate, posterior border slightly produced.

Tegmina and wings considerably longer than the body. Mesonotum and metanotum without long backwardly-directed processes. No scent-gland opening on first abdominal tergite.

♀ with the tegmina short, quadrate, not covering the first abdominal tergite. Sixth and seventh abdominal tergites slightly declivous, seventh tergite not covered by the sixth.

Cartoblatta pulchra sp. n.

(Pl. 2, fig. 4.)

♂. Head pale testaceous, the vertex, a curved band between the eyes, a band at base of clypeus castaneous, antennae fuscous. Pronotum pale testaceous, a complex lyrate mark on the disc and a few points on the lateral margins piceous; disc with an anterior and two lateral impressions. Tegmina, anterior part of the wings and the veins castaneous. Abdomen above flavo-testaceous with fusco-castaneous markings laterally, beneath testaceous heavily marbled with fusco-castaneous; supra-anal lamina quadrate, posterior angles rounded; sub-genital plate produced beyond the supra-anal lamina, posterior angles rounded, styles long, curved, arising from notches in the sides of the sub-genital plate. Cerci moderate. Legs testaceous, blotched with fusco-castaneous; posterior metatarsus equal in length to the remaining joints. 3nd joint not spined, pulvilli apical but rather large.

♀. Similar to ♂ but head less pale testaceous, the vertex not entirely castaneous, the curved band between the eyes narrower. Pronotum trapezoidal, posteriorly obtusely angled, anteriorly truncate, laterally deflexed, flavo-testaceous with more numerous castaneous points. Scutellum exposed. Tegmina castaneous, quadrate, posterior margin slightly concave. Abdomen flavo-testaceous heavily marbled with fusco-castaneous, posterior margin of 7th tergite sinuate, supra-anal lamina narrow,

produced, its apex cleft, genital valves castaneous. Cerci rufous, directed upwards. Posterior metatarsus rather shorter than remaining joints, pulvilli large.

♂. Total length 29 mm.; length of body 20 mm.; length of tegmina 25 mm.; pronotum 4,6 mm. × 7 mm.

♀. Total length 21 mm.; length of tegmina 5,4 mm.; pronotum 5 mm. × 8,2 mm.

Kilimandjaro: Kibonoto 1,300—1,900 métres (March to May; 2 ♂♂, 1 ♀, 8 ♀ larvae.

It is probable that *Stylopyga hova* Sauss. from Madagascar also belongs to this genus.

Gen. **Pseudoderopeltis** Krauss.

Pseudoderopeltis fulvornata sp. n.

(Pl. 2, fig. 9.)

♂. Head fusco-castaneous, ocelli, genae and mouth-parts testaceous, apical joint of maxillary palpi infuscated, basal two joints of antennae testaceous, remainder fuscous. Pronotum with two oblique impressions, castaneous, lateral margins testaceo-hyaline, disc with an irregular flavo-testaceous mark on either side of the middle line. Meso- and metanotum with backwardly directed processes, the latter long and slender. Tegmina rufo-castaneous, extending considerably beyond the end of the abdomen. Abdomen above testaceous at base, castaneous at apex, supra-anal lamina quadrate, its posterior margin slightly concave, testaceous with a central castaneous macula. Abdomen beneath castaneous, the disc rufo-castaneous. Cerci moderate. Legs castaneous, posterior metatarsus very long, pulvilli minute, second joint spined beneath.

Total length 23,5 mm.; length of body 16,9 mm.; length of tegmina 20 mm.; pronotum 4 mm. × 5,9 mm.

Kilimandjaro: Lower Kibonoto (February), 2 ♂♂.

Apparently allied to *Periplaneta brunneriana* Schulth.[1] from Somaliland, a true *Pseudoderopeltis*, and to *P. gildessa*[2] Adel. from Gallaland, but much smaller than either.

Pseudoderopeltis petrophila sp. n.

(Pl. 2, fig. 5—6.)

Allied to *P. saussurei* Adel. ♂. Differs from *P. saussurei* Adel.[3] in the following points: Head entirely black, nitid, except for the testaceous ocelli and rufous clypeus. Pronotum with the lateral yellow fasciae rather broader and extending to the posterior margin. Tegmina and anterior part of the wings dark castaneous. Abdomen above piceous, castaneous at base, beneath, entirely piceous, nitid.

♀. Nitid, piceous ornamented with yellow; allied to *P. spectabilis* Adel.[4] (= *P. saussurei* ♀) but head entirely black, except for ocelli and clypeus, which are as

[1] Ann. Mus. Civ. Gen. XXXIX p. 167 pl. 2, f. 1 (1898).
[2] Ann. Mus. Zool. St. Petersbourg VIII, p. 314 (1903).
[3] Ann. Mus. Zool. de l'Acad. Imp. Sci. St Petersbourg VIII, p. 316 (1903).
[4] l. c. IX, p. 467 (1905).

in the male; vertex rather flattened, rugose, face with two depressions between the antennal sockets, lower face transversely wrinkled. Pronotum with lateral vittae and two marks on the posterior fifth of the disc yellow, these marks are in some specimens joined to the lateral vittae. Tegmina piceous, lobiform, only just extending beyond the mesonotum, their apices rounded. Mesonotum with two irregular yellow marks on the disc. Metanotum with an irregular transverse yellow band. The five basal abdominal tergites each with a broad yellow band occupying the greater part of their surfaces; 6th tergite enlarged, concavely depressed yellow; 7th tergite short, triangularly produced, yellow; supra-anal lamina tectiform, carinate, apex emarginate, yellow with a black line on the margin. Cerci and abdomen beneath piceous.

Measurements of types:

♀. Total length 31 mm.; length of body 23 mm.; length of tegmina 26 mm.; pronotum 5,6 mm. × 7 mm.

♀. Length of body 22 mm.; length of tegmina 3,5 mm.; pronotum 7 mm. × 10 mm.

A very long series (115 specimens) of both sexes in all stages of growth from *Kibonoto* 1,300—2,000 métres, Masai steppes and Lower *Meru* in the acacia forest; the youngest larvae were taken in August and September, older larvae in September and October, the adults in November and December. The females and larvae were found in great quantities under stones bestrewing the steppe-country. Two males from Lower Meru exhibit slight variations, in one the yellow fasciae of the pronotum are reduced to short and narrow stripes, in another they are absent altogether; the size of the latter specimen is considerably less than that of the type, but I can find no other characters entitling it to separate specific rank and it may safely be regarded as an extreme variation. With this valuable and important series of specimens before me it is now possible for the first time to distinguish the females of the genus *Pseudoderopeltis* from the females of allied genera with certainty; as already stated their characteristic feature is the enlarged sixth abdominal tergite, which is concavely depressed and declivous so that the posterior part of the body in profile view appears as if it was obliquely truncated.

The species described by me from British E. Africa as *Blatta rothschildi*[1] must be referred to *Pseudoderopeltis*, the female exhibits all the characters of the genus and the male is possibly an abnormal specimen, for the tegmina are reduced but the right tegmen is shorter than the left; the other male characters such as the form of the meso- and metanotum and the opening of the scent-gland on the 1st abdominal segment conform to the *Pseudoderopeltis* type. *Stylopyga guttata* Sauss.[2] from Galla-land is possibly also a ♀ *Pseudoderopeltis*.

[1] Ann. Mag. Nat. Hist. (7) XIX. p. 39 (1907).
[2] Ann. Mus. Civ. Gen. XXXV. p. 75 (1895).

Gen. **Periplaneta** Burm.

No examples of this cosmopolitan genus occur in Dr. Sjöstedt's collection but two species have been previously recorded from Eastern Africa, viz: *P. americana* L. (von der Decken) and *P. atricollis* Sauss. (Voeltzkow).

Gen. **Deropeltis** Burm.

Deropeltis melanophila Wlk.

Ischnoptera melanophila Walker, Cat. Blatt. Brit. Mus. Suppl., p. 146, 1869.
Deropeltis madecassa de Saussure, Soc. Ent. VI, p. 17 (1891); de Saussure and Zehntner Grandidier's Hist. de Madagascar, Orth. I, p. 77, pl. 3, ff. 28, 29 (1895).

Lower *Meru:* Meru rain-forest 3,000 m. (Oct.—Dec.). *Usambara:* Tanga; 4 ♂♂, 2 ♀♀ larvae.

Also recorded from Madagascar, Zanzibar and East Africa.

Deropeltis integerrima Br.

Deropeltis integerrima Brunner, Nouv. Syst. des Blatt. p. 245 (1865).

Lower *Meru:* Ngare na nyuki (November—January); 2 ♂♂, 6 ♀♀.

Previously recorded from Zanzibar; there is a specimen in the Paris Museum from Mombasa.

Deropeltis autraniana Sauss.

Deropeltis autraniana Saussure, Ann. Mus. Civ. Gen. XXXV, p. 78 (1895).

A long series (96 specimens) from Lower *Meru*, the steppe country and acacia forest (Sept. to Dec.) and *Kilimandjaro:* Kibonoto 1,000—1,300 métres. Abundant under stones.

The species is very variable in size in both sexes and the smaller species are less nitid than the larger. There are specimens in the Hope Museum, Oxford from Nairobi, British East Africa and the species was recorded by de Saussure from Gallaland and West Africa; it is very close to *D. wahlbergi* Stål from S. Africa and may eventually prove to be identical with it. The determination of the species of the genus *Deropeltis* is attended with considerable difficulty, as the number of forms is considerable and a good proportion have been described from one sex alone. The following tables will perhaps render more easy the tedious task of hunting through literature, whenever one of the more obscure species of the genus has to be identified.

Males.

(32) 1. Fuscous or piceous species.
(13) 2. Head and legs or legs alone different in colour to rest of body.
(8) 3. Head and legs rufous or castaneous.

(5) 4. Outer margin of tegmina sinuate . . . . . *erythrocephala* Fab. (S. Africa).
(4) 5. Outer margin of tegmina not sinuate.
(7) 6. Large species . . . . . *dmitriewi* Adel. (Abyssinia).
(6) 7. Small species . . . . . *gracilis* Burm. (S. Africa).
(3) 8. Legs only different in colour to rest of body.
(10) 9. Large species . . . . . *erythropeza* Adel. (Abyssinia).
(9) 10. Small species.
(12) 11. Legs red . . . . . *intermedia* Br. (Natal).
(11) 12. Legs testaceous . . . . . *sculpturata* Krauss. (Guinea).
(2) 13. Head and legs concolorous with rest of body.
(15) 14. Densely pubescent . . . . . *integerrima* Br. (Zanzibar, E. Africa).
(14) 15. Not densely pubescent.
(21) 16. Small species, body-length not exceeding 20—22 mm.
(20) 17. Tegmina considerably exceeding the body.
(19) 18. Pronotum opaque, finely punctate . . . . *wahlbergi* Stål. [= *atra* Br.] (S. Africa).
(18) 19. Pronotum nitid . . . . . *autraniana* Sauss. (Gallaland, E. and W. Africa).
(17) 20. Tegmina scarcely exceeding the body . . . *kachovskii* Adel. (Abyssinia).
(16) 21. Larger species.
(29) 22. Tegmina considerably exceeding the body.
(24) 23. Pronotum relatively very small . . . . . *adelungi* nom. n. [= *gracilis*, Adel.] (Abyssinia).
(23) 24. Pronotum relatively larger.
(26) 25. Posterior margin of mesonotum with long triangular processes . . . . . *pallidipennis* Adel. (Abyssinia).
(25) 26. Posterior margin of mesonotum without these processes.
(28) 27. Body-length 22 mm. . . . . *nigrita* Sauss. (Somaliland).
(27) 28. Body-length 29 mm. . . . . *melanophila* Wlk. (Madagascar E. Africa).
(22) 29. Tegmina not exceeding body by much.
(31) 30. Body-length 23 mm. . . . . *barbeyana* Sauss. (Somaliland).
(30) 31. Body-length 36,5 mm. . . . . *tullbergi* Borg (Cameroons).
(1) 32. Ferruginous or testaceous species.
(34) 33. Pronotum piceous . . . . . *bueana* Karsch. (Cameroons).
(33) 34. Pronotum not piceous.
(36) 35. Pronotum with three impressions on disc . . *triimpressa* Krauss. (Guinea).
(35) 36. Pronotum not as above . . . . . *negus* Adel. (Abyssinia).

Females.

(24) 1. Fuscous or piceous species.
(23) 2. Without rufous fasciae on the pronotum.
(8) 3. Head and legs castaneous or rufous.
(5) 4. Castaneous . . . . . *erythropeza* ADEL.
(4) 5. Rufous.
(7) 6. 6th and 7th abdominal tergites with a fulvous macula on either side . . . . . *dichroa* GERST. (Gold Coast).
(6) 7. Abdominal tergites uniformly coloured . . . *erythrocephala* FAB.
(3) 8. Head and legs concolorous with rest of body.
(10) 9. Densely pubescent . . . . . *integerrima* BR.
(9) 10. Not densely pubescent.
(20) 11. Angles of thoracic tergites strongly produced backwards.
(19) 12. Species exceeding 24 mm. in length.
(18) 13. Posterior margin of pronotum straight.
(17) 14. Posterior angles of abdominal tergites spiniform.
(16) 15. 38 mm. in length . . . . . *robusta* GERST. (Cameroons).
(15) 16. 25 mm. in length . . . . . *gaboonica* REHN (Gaboon).
(14) 17. Posterior angles of abdominal tergites not spiniform . . . . . *melanophila* WLK. [= *speiseri* BRANCS.]
(13) 18. Posterior margin of pronotum sinuate. . . . *schweinfurthi* SAUSS. (Somaliland).
(12) 19. Smaller species . . . . . *nigrita* SAUSS.
(11) 20. Angles of thoracic segments not strongly produced backwards. . . . . *kachovskii* ADEL.
(22) 21. Posterior margin of pronotum sinuate . . . *barbeyana* SAUSS.
(21) 22. Posterior margin of pronotum straight . . . *carbonaria* GERST. (W. Africa). *autraniana* SAUSS.
(2) 23. With rufous fasciae on the margins of the pronotum . . . . . *paulinoi* BOL. (Angola).
(1) 24. Ferruginous species . . . . . *triimpressa* KRAUSS.

As our knowledge of the genus extends, it will probably be found that some of these names are synonymous, e. g. *D. robusta* GERST. may prove to be the female of *D. tullbergi* BORG. DE SAUSSURE gives the range of *D. autraniana* as West Africa (Abetifi), Somaliland and Gallaland; from the descriptions alone I find it impossible to distinguish de SAUSSURE's species from *D. carbonaria* GERST. The following species which have been recorded by various authors as of the genus *Deropeltis*, either belong to other genera or else are of uncertain position:

Blatta capensis Thunb. = *Deropeltis erythrocephala* Fab.
Euryzosteria delalandii Sauss. = *Deropeltis erythrocephala* Fab.
Perisphaeria verticalis Burm. = ? *Deropeltis.*
Periplaneta orba Stål. = *Pseudoderopeltis.*
Periplaneta albilatera Stål. = *Pseudoderopeltis.*
Periplaneta caffra Stål. = *Periplaneta caffra.*
Kakerlac brevicollis Serv. = ? *Pseudoderopeltis.*
Ischnoptera longipennis Wlk.
Ischnoptera juncea Sauss.
Ischnoptera similis Sauss.
Deropeltis longipennis Sauss.
Deropeltis antennata Sauss. } = *Pseudoderopeltis*
Polyzosteria capensis Sauss.
[= *Deropeltis flavomarginata* Br.] } = *Pseudoderopeltis.*
Polyzosteria meridionalis Sauss.
[= *Deropeltis bivittata* Br.
= *Deropeltis distanti* Kirby] } = *Blatta.*
Ischnoptera macra Stål. = *Perisphaeriinæ.*
Deropeltis burmeisteri Sauss.
Deropeltis peringueyi Sauss. } ? *nomina nuda*, only mentioned in a synoptical key (Ann. Mus. Civ. Gen. vol. XXXV, p. 77 (1895).

Fam. **Panchloridæ.**

Gen. **Leucophaea** Br.

Leucophaea sp.

Kilimandjaro: Kibonoto 1,300—1,900 (November). 9 larvae (♂ and ♀).

These are not the larvae of *L. surinamensis* L. being considerably larger; it is in the highest degree probable that they belong to an undescribed species. *Surinamensis* has been recorded from Wanga (von der Decken).

Gen. **Panchlora** Burm.

Panchlora camerunensis Borg.

Panchlora camerunensis Borg. Bih. K. Svenska Vet. Akad. Afd. IV, No. 10, p. 24, 1902.

Kilimandjaro: Kibonoto 1,000—1,900 métres (November, March), 8 ♂♂, 8 ♀♀, 1 larva.

This appears to be the same species as that described by Borg from the Cameroons, also collected by Dr. Sjöstedt; the East African specimens are a trifle larger but otherwise appear to be identical.

Gen. **Nauphoeta** Burm.

Nauphoeta cinerea Oliv.

Blatta cinerea Olivier, Enc. Méth. Ins. IV, p. 314, n. 3, 1789.

Kilimandjaro (Sept.); Kibonoto 1,000—1,900 métres (May); *Usambara:* Mombo (June); 2 ♂♂, 4 ♀♀, 3 larvae.

A widely distributed species.

Gen. **Gyna** Br.

Gyna vetula Br.

Gyna vetula Brunner v. Wattenwyl, Nouv. Syst. des Blatt. p. 267 (1865).

In the Mkulumusi-caves at *Tanga* (July), 1 ♂, 1 ♀, 17 larvae.

Previously recorded from Mombasa (von der Decken) and the East coast of Africa.

It seems quite certain that the genera *Trichomera* Kirby[1] and *Apotrogia* Kirby[2] are founded on immature specimens of species of *Gyna*. The larvae collected by Dr. Sjöstedt are certainly most closely allied to *Trichomera insignata* Kirby; they are preserved in alcohol together with one adult male in bad condition and were probably taken altogether from under one shelter. The backwardly produced angles of the meso- and metanotum proclaim the immature condition of these specimens as well as of *T. insignata* Kirby and *Apotrogia angolensis* Kirby. I find moreover that the structure of the maxillary and labial palpi, the form of the coxae and the arrangement of speines on the tibiae is identical in the larvae and adults. The palpi in the genus *Gyna* are highly characteristic, being very slender and rather long, and the coxae are provided with a peculiar curved flange, situated on the outer posterior angle; the front tibiae in the larvae are shorter than they are in the adults, but this feature is probably associated with fossorial habits, abandoned when the insects become winged adults. The arolium between the tarsal claws does not develop until the larvae are nearly full-grown and it is then smaller than in the adult. The pronotum is far less backwardly produced in the larvae than in the adults, as is also the case with larval Epilamprides, larvae of *Panchlora* and of *Rhyparobia*. Finally the larvae are much more heavily marked with castaneous than are the adults and there are rows of minute tubercles on the dorsal tergites.

Gen. **Phenacisma** Karsch.

The type of the genus, *P. peltata* Karsch has been recorded from Mombasa.

[1] Ann. Mag. Nat. Hist. (6) XVIII. p. 257 (1896).
[2] ibidem (7) V, p. 281 (1900).

Fam. **Corydiidæ.**

Gen. **Anacompsa** nov.

Finely pubescent. Eyes approximate. Antennae filiform, shorter than body. Pronotum cucullate, covering vertex of head, small, sides deflexed, posterior border arcuate. Tegmina and wings elongate, extending considerably beyond the apex of the abdomen; costal veins few and irregular, discoidal area of tegmina reticulated, axillary veins obsolescent; posterior part of wing ample, median vein simple, ulnar vein ramose at extremity. Supra-anal lamina of ♂ transverse. Cerci moderate. Tibiae weakly armed, spines on posterior pair triseriate with 4 apical calcaria, 4 apical calcaria on front pair. Tarsal claws with arolia.

In general appearance the genus resembles *Latindia* Stål but is distinguished from that and its allies, *Hemilatindia* Sauss. and *Paralatindia* Sauss. by the triseriate arrangement of the tibial spines. From *Holocompsa* Burm. and *Hypercompsa* Sauss. it is distinguished by the long tegmina of uniform texture; *Ipisoma* Bol. is characterised *inter alia* by the reduced tegmina. It is probable that a considerable number of species of these fragile little cockroaches are still unknown to science, they are rare in collections but probably because they have been neglected by most collectors in favour of larger and more conspicuous forms.

Anacompsa cucullata sp. n.

(Pl. 2, fig. 10 and 11, Pl. 3, fig. 9.)

♂. Head dark castaneous, mouth parts testaceous; frons not swollen, ocelli large. Antennae fuscous, filiform, of 30 joints, joints longer than broad and increasing in length distally. Pronotum rufo-testaceous, disc with two oblique impressions. Tegmina long, overlapping strongly, finely pubescent, membranous, rufo-testaceous with a broad humeral vitta extending to half the total length, fuscous; mediastinal vein with a few incomplete branches, 6 costal veins, their ends not reaching the anterior margin of the tegmen, anterior ulnar ramose at its apex, posterior ulnar ramose, transverse anastomoses uniting the branches, anal vein curved reaching the sutural margin at a point one-fifth of the total length, axillary veins obsolescent. Wings hyaline, flavo-testaceous on the sutural margin, mediastinal vein simple, 6 irregular costals, ulnar vein ramose at its extremity, posterior field ample larger than the anterior field. Abdomen castaneous, flavo-testaceous at base, supra-anal lamina transverse, sub-genital small, right style absent, left style represented by a flattened lobe, the origin of which is hidden by the penultimate sternite. Cerci moderate, testaceous, segmentation obscure. Legs testaceous; front tibiae with only 4 spines on the anterior border, 2 being apical, 3 on the posterior border, 2 being apical; spines on mid- and hind-tibiae triseriate; front femora with no genicular spine, formula of apical spines $\frac{1}{0}$, $\frac{1}{0}$, $\frac{1}{0}$.

Total length 10,5 mm.; length of body 7,5 mm.; length of tegmina 9 mm.; pronotum 2 mm. × 2,9 mm.

Lower *Meru*: Ngare na nyuki (January); 2 ♂♂.

Gen. **Sphecophila** Shelf.

Sphecophila termitium sp. n.

(Pl. 3, figs. 1—2.)

♂. Fulvous, rufo-fimbriate. Head with vertex not covered by pronotum, antennae consisting of 30 joints, similar in structure to those of *S. polybiarum* mihi,[1] frons swollen, ocelli minute, eyes much reduced. Body above with a minute recumbent pubescence, margins rufo-fimbriate. Posterior margins of pronotum and of mesonotum slightly obtusely angled, postero-lateral angles of meso- and meta-notum backwardly produced. Ten abdominal tergites visible, 8th and 9th very narrow almost concealed beneath the 7th, supra-anal lamina quadrangularly produced, angles rounded, posterior margin slightly excised; cerci short, one-jointed, acuminate; seven abdominal sternites visible, subgenital lamina sub-triangularly produced, rounded, with a pair of slender styles, podical plates prominent, tumid. Legs as in *S. polybiarum*, except that there is an anterior apical spine on the front femora, genicular spines of first and second femora very stout and long.

Total length 7,1 mm.; pronotum 2,1 mm. × 4,1 mm.

Kilimandjaro: Kibonoto, March 1906. 2 ♂♂ from nest of *Termes bellicosus*.

It is certainly surprising to find a species of cockroach symbiotic with termites in E. Africa, congeneric with a South American species living in a wasp's nest; I have utterly failed to find, however, any characters entitling the former species to separate generic rank from the latter. The large size and the brilliant fulvous colour of the African species readily serve to distinguish it from *S. polybiarum*, but in both species the structure of the head, eyes, mouth-parts, form of the body, armature of the legs, shape of the terminal abdominal scutes is closely similar. Dr. Sjöstedt's specimens have been preserved in alcohol and the abdominal segments have become somewhat distended, so that the podical plates appear very prominently, but they are also clearly visible in dried specimens of *polybiarum* and their prominence may possibly be regarded as a character of the genus. Further collections of cockroaches symbiotic with other insects will reveal perhaps some day the wide distribution of this genus. At present the species described here is the only cockroach living in company with social insects that has yet been recorded from the Old World.

Gen. **Euthyrrhapha** Burm.

The cosmopolitan species *E. pacifica* Coq. has been recorded from Wanga (von der Decken).

[1] Trans. Ent. Soc. London 1906, p. 518.

Fam. **Oxyhaloidæ.**

Gen. **Oxyhaloa** Br.

Key to E. African species.

1. Tegmina smooth . . . . . *O. ferreti* Reiche and Fairm.
1'. Tegmina with minute recumbent pubescence.
   2. Tegmina attaining end of abdomen . . . . *O. deusta* Thunb.
   2' Tegmina not attaining end of abdomen. . . *O. variabilis* Shelf.

Oxyhaloa variabilis Shelf.

Oxyhaloa variabilis Shelford, Ann. Mag. Nat. Hist. (7) vol. 19, p. 41, 1907.

Kilimandjaro: Kibonoto 1,000—1,300 métres (Feb., Apr., Nov.); 3 ♀. Previously recorded from the interior of Djibouti. The species is very close to *O. deusta* Thunb. (= *fulviceps* Burm.), which together with *O. ferreti* Reiche and Fairm. has been recorded from Lake Jipe at Kilimandjaro (von der Decken).

Fam. **Perisphaeriidæ.**

Gen. **Gynopeltis** Gerst.

Gynopeltis cryptospila Wlk.

Polyphaga cryptospila Walker, Cat. Blatt. Brit. Mus., p. 15 (1868).
Gynopeltis picta Gerstaecker, Arch. Naturg. XXXV, p. 208 (1869); Von der Decken's Reisen in Ost-Afrika, III (2), p. 9, pl. 1, ff. 1, 2 (1873).

Kilimandjaro »Mischwald»; Kibonoto 1,000—1,900 métres; Steppe country. *Meru* 3,000 métres. 4 ♂♂, 10 ♀♀. Previously recorded from Endara and Mosambique.

Gen. **Derocalymma** Burm.

The two East African species can be distinguished as follows:

Males.

1. Body-length 19 mm., antennae entirely fuscous . . . . . *porcellio* Gerst.
1'. Body length 15 mm., antennae with broad pale annulus . . *lampyrina* Gerst.

Females.

1. Length of pronotum : breadth of pronotum : : 550 : 935; antennae enterely fuscous . . . . . *porcellio* Gerst.
1'. Length of pronotum : breadth of pronotum : : 550 : 1050; antennae with broad pale annulus at base and at apex. . . . . *lampyrina* Gerst.

Derocalymma porcellio Gerst.

Derocalymma porcellio Gerstaecker Arch. Naturg. XXXV, p. 207 (1869); Von der Decken's Reisen in Ost-Afrika, III (2), p. 7, pl. 1, f. 3 (1873).

Lower *Meru:* Ngare na nyuki. *Kilimandjaro:* Kibonoto 1,000—1,300 métres (Sept. to Jan.); 19 ♀♀ adult and larval. Previously recorded from Lake Jipe at Kilimandjare and Uru, East Africa.

Derocalymma lampyrina Gerst.

Derocalymma lampyrina Gerstaecker, ll. cc., p. 207 (1869); p. 8 (1873).

Usambara: Mombo (June); 3 ♀♀. Previously recorded from between Lake Jipe and the Bura Mts.

Gen. **Cyrtotria** Stål [= **Stenopilema** Sauss.]

Dr. Sjöstedt has kindly sent to me for examination a number of Stål's types of Blattidæ. Amongst these are the male and female types of *Cyrtotria gibbicollis* Stål and they prove to be congeneric with the species included by de Saussure and Zehntner (Rev. Suisse Zool. III, p. 25 (1895) in the genus *Stenopilema.* In the genus *Cyrtotria* the distinguished Swiss orthopterists place *Derocalymma dispar* Burm. *Cyrtotria macra* Stål and with some doubt *Perisphaeria affinis* Burm.; the first of these is certainly not congeneric with *C. gibbicollis* Stål and a new genus must be created for its reception; the type is in Brunner's collection and has been well described so that it is easily recognisable, the other two species are of uncertain systematic position. *Stenopilema* Sauss. of course sinks as a synonym of *Cyrtotria* Stål. It may be noted here that *Perisphaeria linearis* Walk. is synonymous with *Cyrtotria gibbicollis* Stål.

Cyrtotria capucina Gerst.

Derocalymma capucina Gerstaecker, Arch. Naturg. XXXV, p. 207 (1869); Von der Decken's Reisen in Ost-Afrika, III (2), p. 8, pl. 1, f. 4 (1873).

♂. Piceous. Eyes contiguous; antennae fuscous, basal joints paler; ocelli and mouth parts testaceous. Pronotum with margins castaneous, disc strongly punctate with a few smooth interspaces, anteriorly carinate. Tegmina dark castaneous in basal fourth, remainder testaceous, marginal area at base testaceous, eight longitudinal discoidal sectors. Wings hyaline, veins testaceous, ulnar vein sending one branch to apex of wing, six incomplete branches to dividing vein. Supra-anal lamina quadrate, its posterior margin slightly concave; sub-genital lamina irregular, laterally margined with testaceous; cerci and styles testaceous. Coxae castaneous, outwardly margined with testaceous; legs testaceous.

Total length 18,7 mm.; length of body 14 mm.; length of tegmina 15,5 mm.; pronotum 4 mm. × 4 mm.

Cyrtotria gibbicollis STÅL is very near this species.

Kilimandjaro: Kibonoto 1,000—1,900 métres, Masai steppes (Aug. to Nov.). Lower *Meru.* 2 ♂♂, 33 ♀♀ adult and larval. Previously recorded from Aruscha, E. Africa.

Cyrtotria tuberculata sp. n.

♀. Allied to *C. capucina* GERST. but the pronotum anteriorly with small scattered tubercles, posteriorly rugose with a few fine punctures. Head more rufous.

Total length 15 mm.; pronotum 5 mm. × 5 mm.

Kilimandjaro: Lower Kibonoto (Feb.), 1 ♀.

Gen. **Parasphaeria** BR.

Parasphaeria ? marmorata sp. n.

(Pl. 2, fig. 8.)

♀. Testaceous, marbled with fuscous. Head only half covered by pronotum; eyes rather small and wide apart, ocelli absent, antennae fuscous, equal to half the body-length; frons rufo-castaneous, face with dark markings. Pronotum trapezoidal, anterior and posterior margins truncate, lateral margins hyaline, disc with a few shallow punctures and with a dark lyrate marking. Tegmina lobiform, testaceo-hyaline; mesonotum and metanotum with scattered punctures and dark markings symmetrically arranged, lateral margins hyaline. Abdominal tergites with scattered shallow punctures laterally bordered with testaceous, their posterior margins broadly olive brown, a central row of fuscous spots and a sub-marginal row on each side of similar markings, in addition some irregular fuscous markings between the central and submarginal rows; 1st to 7th tergite divided by a transverse suture into a narrow anterior half and a broader posterior half. Supra-anal lamina slightly produced, trigonal; cerci very short, of four joints. Abdominal sternites with submarginal row of castaneous spots, an irregular transverse row of markings on each sternite, except the last which is castaneous on the disc; each sternite exeept the last is divided like the tergites; sub-genital lamina ample, semiorbicular, extending beyond the supra-anal lamina. Legs short, testaceous, a fuscous line on the outer side of the femora; tibial spines in three rows: posterior metatarsus not equal to the remaining joints; arolia large.

Length 15 mm.; pronotum 3 mm. × 4,5 mm.

Lower *Meru* (Nov.); 1 ♀.

I have been unwilling to place this species in the Neotropical genus *Parasphaeria*, but the unique female specimen certainly presents no features whereby it can be separated therefrom; the exposed head, lobiform tegmina, tibial spines and short tarsi are the distinctive characters of *Parasphaeria* and until the male sex is discovered this species must be allowed a place in that genus.

Table showing the distribution in other parts of Africa of the species of the Kilimandjaro-Meru district.

Kilimandjaro-Meru district	Cosmopolitan	Abyssinia	Somaliland	E. Africa from 5° S. to Zambezi	Africa S. of Zambezi	W. Africa	Madagascar
1. *Theganopteryx africana*	.	.	.	×		.	.
2. *Theganopteryx saussurei*	.	.	×	.	.	×[1]	.
3. *Mallotoblatta kraussi*	.	×		.	.	.	.
4 *Hololampra aethiopica*	.	.	.	.	.	.	.
5. *Hololampra sjöstedti*	.	.	.	.	.	.	.
6 *Ischnoptera bimaculata*	.	.	.	×	.	.	.
7. *Ischnoptera incuriosa*	.	.	.	×	×	.	.
8. *Ischnoptera neutra*	.	.	.	×	.	.	.
9. *Phyllodromia germanica*	×	.	.	.	.	.	.
10. *Phyllodromia bivittata*	×	.	.	.	.	.	.
11. *Phyllodromia supellectilium*	×			.	.		.
12. *Phyllodromia zehntneri*	.	.	.	.	.	.	×
13. *Phyllodromia nigromarginata*	.	.		.	.	.	.
14. *Phyllodromia sjöstedti*		.		.	.	.	.
15. *Phyllodromia insignis*		.			.	.	.
16. *Phyllodromia testacea*		.		.	.	.	.
17. *Phyllodromia trigonalis*	.	.	.	×	.	.	
18. *Ceratinoptera bimaculata*	.	.			.	.	.
19. *Ceratinoptera castanea*	.	.			.	.	.
20. *Ceratinoptera sjöstedti*	.	.	.		.	.	.
21. *Ceratinoptera variabilis*	.		.	.	.	.	.
22. *Ceratinoptera perpulchra*	.	.			.	.	.
23. *Ceratinoptera ferruginea*	.	.	.	×	.	.	.
24 *Ceratinoptera ovata*	.	.	.	.	.	.	.
25. *Ceratinoptera variegata*	.	.	.	×	.	.	.
26. *Ceratinoptera dimidiata*	.		.	.	.	.	.
27. *Temnopteryx abyssinica*	.	×	.	×	.	.	.
28. *Temnopteryx ectobioides*				.			.
29. *Temnopteryx caffra*	.	.	.	×	.		.
30. *Temnopteryx affinis*		.		.	.		.
31. *Temnopteryx rufa*		.	.	.		.	.
32. *Loboptera nitida*		.	.	.	.		.
33. *Apteroblatta perplexa*		.	.	.			.
34. *Calolampra aptera*	.	.	×			.	.
35. *Eustegasta obsoleta*	.	.	.	×		.	.
36. *Eustegasta pœcila*	.	.	.	×	.	.	.
37. *Paramethana robusta*		.		.	.	.	.
38. *Blatta propinqua*	.	×	×		.	.	.
39. *Stylopyga hottentota*	.	.	.	×		.	.
40. *Stylopyga rhombifolia*	×	.		.			.
41. *Cartoblatta pulchra*		.	.	.	.	.	.

[1] An cross (×) denotes a closely allied species or topomorph.

Kilimandjaro-Meru District	Cosmopolitan	Abyssinia	Somaliland	E. Africa from 5° S. to Zambezi	Africa S. of Zambezi	W. Africa	Madagascar
42. *Pseudoderopeltis fulvornata*		.	.	.			
43. *Pseudoderopeltis petrophila*		.					
44. *Periplaneta americana*	+	.					
45. *Periplaneta atricollis*		.		.			
46. *Deropeltis melanophila*	.	.	.	+	.	.	+
47. *Deropeltis integerrima*		.		.			
48. *Deropeltis autraniana*	.	+	.	+	.	+	
49. *Panchlora camerunensis*	.					.	
50. *Nauphoeta cinerea*	+	.					
51. *Gyna vetula*	.	.	.	.			
52. *Phenacisma peltata*		.					
53. *Anacompsa cucullata*		.					
54. *Sphecophila termitium*		.					
55. *Euthyrrhapha pacifica*	.	.					
56. *Oxyhaloa deusta*	.	.	.	+	+		
57. *Oxyhaloa ferreti*	.	+		.			
58. *Oxyhaloa variabilis*		.		.			
59. *Gynopeltis cryptospila*	.	.	.	+	+	.	
60. *Derocalymma porcellio*		.		.			.
61. *Derocalymma lampyroides*		.					.
62. *Cyrtotria capucina*	.	.	.	.	+		
63. *Cyrtotria tuberculata*							
64. *Parasphaeria (?) marmorata*		.		.			

The above table includes 64 species[1] and a glance at their distribution shows as might have been safely predicted that the closest affinity of this Blattid fauna is found in East Africa between the 5th degree of latitude and the Zambezi River; 20 of the species are common to these two areas and I have little doubt that the number would be increased if our knowledge of the cockroaches of the latter area was greater than it is. 7 of the species are cosmopolitan or nearly so and consequently afford no evidence worth taking into consideration. The relationship with the Abyssinian fauna is rather surprisingly remote, but can perhaps be accounted for by the intervention of the xerothermic area of Somaliland and Gallaland between the damp moist regions of Abyssinia and Kilimandjaro; it is significant that there is a much closer relationship between the faunas of these two regions in the case of insects capable of sustained flight such as the Lepidoptera Rhopalocera. Only 4 of the species occur also in Africa south of the Zambesi and the entire absence from the Kilimandjaro region of certain highly characteristic South African genera is in sharp contrast to the fact that all the Abyssinian genera save two[2] are represented in the Kilimandjaro region. The connection with the West African and Mascarene faunas

[1] An immature and undetermined species of *Leucophaea* is omitted.

[2] One of these two is *Paraloboptera*, a genus barely separable from *Loboptera* which is represented by one species in the Kilimandjaro regions.

is of the remotest, but that there should be any species common to regions so widely separated is of much interest. The absence from a given fauna of certain genera and species often affords as much food for speculation and as many points of interest as the presence of others, and this fauna offers no exception to such a statement. The genus *Anaplecta* is moderately represented in West Africa but except for one species from the Soudan is absent in the East. *Epilampra* is well represented in West Africa but is entirely absent from the Eastern and Southern regions, its place being filled to a certain extent by the genus *Gyna*, though this too is poorly represented both in numbers of species and individuals in the Kilimandjaro and Abyssinian regions. *Polyphaga* is a characteristically dry-country genus, its absence from Dr. SJÖSTEDT's collection is therefore not surprising; in Abyssinia, Somaliland and South Africa it is well represented. South Africa may be regarded as the head-quarters of the family *Perisphaeriidae* and such genera as *Aptera*, *Pronaonota*, *Pilema*, *Melanoblatta*, *Hostilia*, *Pæciloblatta* and others are peculiar to this region and include some of the most abundant species; in the Kilimandjaro region this sub-family is represented by four genera and six species only, two of the species being represented in Dr. SJÖSTEDT's collection by a good number of individuals, nearly all of the female sex, still it cannot be said that this sub-family is dominant in this region. The most dominant species of the Kilimandjaro fauna, as evidenced by the number of individuals captured, are the species of the genera *Pseudoderopeltis* and *Deropeltis*, and notably *P. petrophila* and *D. autraniana;* these were taken in great abundance at all seasons of the year and at varying altitudes and in a letter Dr. SJÖSTEDT informs me that many were found under the boulders bestrewing the Masai steppe-country.

The discovery of a cockroach symbiotic with termites is of much interest and that this species should be strictly congeneric with a species found in the nest of a social wasp in S. America is a fact that can scarcely be explained on any other supposition than that further collecting will reveal the wide spread distribution of the genus thoughout the tropics.

PLATE 2.

Plate 2.

Fig. 1. *Hololampra æthiopica* Shelf. n. sp. ♀.
2. *Ceratinoptera perpulchra* Shelf. n. sp. ♀.
3. *Apteroblatta perplexa* Shelf. n. sp. ♀.
4. *Cartoblatta pulchra* Shelf. n. sp. ♀.
5. *Pseudoderopeltis petrophila* Shelf. n. sp. ♀.
6. » ♀ from the side.
7. *Paramethana robusta* Shelf. n. sp. ♀.
8. *Paraspheria marmorata* Shelf. n. sp. ♀.
9. *Pseudoderopeltis fulvornata* Shelf. n. sp. ♂.
10. *Anacompsa cucullata* Shelf. n. sp., wing.
11. , tegmen.
12. *Temnopteryx ectobioides* Shelf. n. sp. ♂; apex of abdomen, ventral view.
13. *Apteroblatta perplexa* Shelf. n. sp. ♂; » » »
14. *Phyllodromia testacea* Shelf. n. sp. ♂: , dorsal

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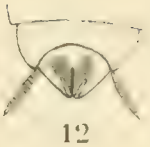

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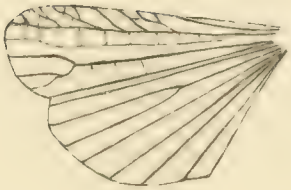

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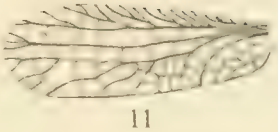

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H. Knight et auctor delin. Ljustr. Justus Cederquist, Sthlm

Shelford: Blattodea.

PLATE 3.

Plate 3.

Fig. 1. *Sphecophila termitium* Shelf n. sp. ♂; Lg 7,1 mm.
» 2. » » ♂; side view of head.
» 3. *Mallotoblatta kraussi* Adel. ♂; apex of abdomen, dorsal view.
» 4. *Hololampra æthiopica* Shelf. n. sp. ♂; apex of abdomen, dorsal view.
» 5. » » ♂; titillator of penis.
» 6. *Ischnoptera incuriosa* Sauss. ♂; apex of abdomen, dorsal view.
» 7. » » » ♂; » » » , ventral view.
» 8. *Phyllodromia insignis* Shelf. n. sp. ♂; apex of abdomen, ventral view.
» 9. *Anacompsa cucullata* Shelf. n. sp. ♂; apex of abdomen, ventral view.
» 10. *Ischnoptera bimaculata* Gerst. ♂; apex of abdomen; dorsal view.
» 11. *Phyllodromia supellectilium* Serv. ♂; apex of abdomen, dorsal view.
» 12. » *nigromarginata* Shelf. n. sp. ♂; apex of abdomen, dorsal view.
» 13. *Ceratinoptera perpulchra* Shelf. n. sp. ♂; apex of abdomen, dorsal view.
» 14. *Hololampra æthiopica.* ♂; wing.
» 15. *Ischnoptera bimaculata* Gerst. ♂; apex of abdomen, ventral view.
» 16. *Ceratinoptera sjöstedti* Shelf. n. sp. ♂; apex of abdomen, ventral view.
» 17 » » ♂; titillator of penis.


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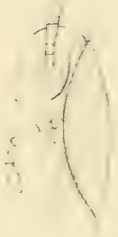
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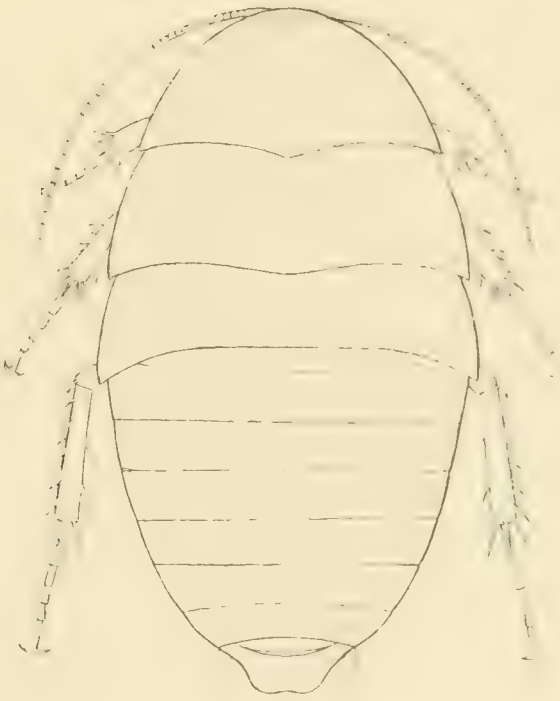
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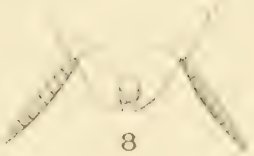
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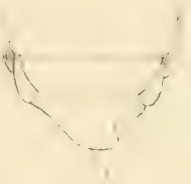
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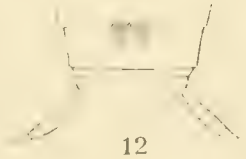
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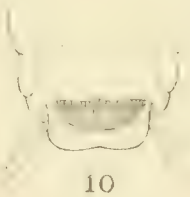
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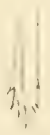
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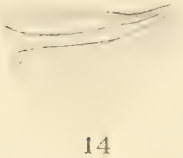
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THE BLATTIDAE

collected in the Aru and Kei Islands by Dr. H. Merton

by

R. Shelford, M. A.

Oxford University Museum.

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collected in the Aru and Kei Islands by Dr. H. Merton

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Oxford University Museum.

Eingegangen 10. April 1909.

Sub-fam. **Phyllodromiinae.**

***Ellipsidion* sp.**

2 larvae.

Aru Islands, Kobroor, bei Seltutti (4. May 1908), Terangan, bei Ngaiguli (18. February 1908).

***Phyllodromia* sp.**

1 larva.

Aru Islands, Barkai (6. April 1908).

***Phyllodromia germanica* L.**

1 ♂.

Aru Islands, Terangan, bei Erersin (8. May 1908).

Sub-fam. **Epilamprinae.**

***Rhicnoda* sp.**

2 young larvae.

Aru Islands, Wokam, am Ufer des Sungi Panua-Bori (14. March 1908).

The species of this genus are amphibious.

Sub-fam. **Blattinae.**

***Cutilia nitida* Br.**

1 ♂.

Aru Islands, Kobroor, bei Seltutti (4. May 1908).

The species ranges from Formosa to Australia.

***Periplaneta americana* L.**

2 ♂, 2 ♂ larvae, 2 ♀ larvae.

Aru Islands, Wammer, bei Dobo (25. March 1908), Kobroor, Manumbai (12. March 1908), Terangan, bei Popdjetur (10. February 1908).

***Periplaneta australasiae* Fab.**

1 ♂, 1 ♀, 1 larva.

Aru Islands, Terangan, bei Popdjetur (10. February 1908), Meriri (27. January 1908).

Periplaneta truncata Krauss.

2 ♂♂, 2 ♀♀.

Aru Islands, Wammer, bei Dobo (25. March 1908), Meriri (27. January 1908).

Eroblatta cercata sp. n.

♀ Testaceous. Vertex and two maculae on the frons castaneous. Antennae setaceous, unicolorous testaceous. Pronotum with a sparse erect pubescence, the disc darker than the margins, anteriorly two oblique sulci and two oblique sulci near the posterior angles. Tegmina narrow and, together with the wings, extending considerably beyond the apex of the abdomen: marginal area very pale testaceous, disc rufo-testaceous except at the base where it is rufo-castaneous; anal field long and pointed, together with the base of the discoidal area, finely reticulated. Wings hyaline. Supra-anal lamina narrowly triangular, carinate, apex emarginate. Disc of abdomen beneath piceous. Cerci very long ($^3/_4$ length of posterior tibiae), with 13 joints, apex acuminate. Femora moderately armed. Pulvilli large, occupying the entire length beneath of the 2nd—4th tarsal joints, surrounded by spines.

Total length 24 mm.; length of body 18 mm.; length of tegmina 20 mm.; pronotum 5.5 mm.

1 ♀.

Aru Islands, Terangan, Ngaiguli (6. February 1908).

Sub-fam. **Panchlorinae.**

Leucophaea surinamensis L.

2 ♂♂, 1 larva.

Aru Islands, Wammer, bei Dobo (25. March 1908), Kobroor, bei Seltutti (4. May 1908).

One of the males is the small variety of this species.

Sub-fam. **Panesthiinae.**

Panesthia Kheili Bol.

4 ♀♀, 1 larva.

Aru Islands, Wammer (30. January 1908); Kei Island, Dulah (28. May 1908).

2nd Ser. ZOOLOGY.] [VOL. V. PART 5.

THE

TRANSACTIONS

OF

THE LINNEAN SOCIETY OF LONDON.

THE EXTERNAL MORPHOLOGY OF THE LEPIDOPTEROUS PUPA: ITS RELATION TO THAT OF THE OTHER STAGES AND TO THE ORIGIN AND HISTORY OF METAMORPHOSIS.—Parts I.–III.

BY

EDWARD B. POULTON, M.A., F.R.S., F.L.S.,

OF KEBLE AND JESUS COLLEGES, OXFORD.

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V. *The External Morphology of the Lepidopterous Pupa: its Relation to that of the other Stages and to the Origin and History of Metamorphosis.*—Parts I.–III. *By* Edward B. Poulton, *M.A., F.R.S., F.L.S., of Keble and Jesus Colleges, Oxford.*

(Plates XX. & XXI.)

Read 21st November, 1889.

Contents.

Introduction.—The observations recorded in this paper and those which will follow it were begun in the autumn of 1883, and have been continued intermittently up to the present date. The remarkably characteristic form of the external generative organs in both sexes of the pupæ of several British Sphingidæ first directed my attention to the subject. For a long time I hoped that it would be possible to bring out a monograph dealing with the whole question. The length of time which must have elapsed before anything like a complete treatise could have been produced, and the difficulties attending the only suitable form of publication, as a quarto volume, have induced me to take the advice long ago offered by Prof. E. Ray Lankester, and to bring out a series of papers dealing successively with the various morphological features which can be detected on the surface of the Lepidopterous pupa.

In the meantime my friend Mr. W. Hatchett Jackson, Deputy Linacre Professor of Human and Comparative Anatomy in the University of Oxford, has also been studying

one part of the same subject, viz. the external reproductive organs, although the principal part of his investigation has been concerned with the development of the internal organs. Under these circumstances we both agreed that it would be advisable to publish at the same time and through the same channel. The two papers will thus supplement each other—Mr. Jackson's supplying the details of internal anatomy at various stages of development, mine dealing with the external organs in a number of different species. For this reason the first paper of my series is chiefly concerned with the external reproductive organs. I may add that I had intended to work out the internal anatomy by means of sections and dissections, but, in the press of other work, such an investigation might have caused the indefinite postponement of publication; I am therefore especially pleased that Mr. Jackson should have been led to undertake this inquiry.

The Names of the various Appendages &c. of the Pupa.—It has been the custom hitherto to speak and think of the various parts of the pupa as if they were mere cases for the corresponding part of the imago. Thus the terms *ophthalmothecæ*, *pterothecæ*, *ceratothecæ*, *podothecæ*, &c. have been applied to the parts within which the imaginal eyes, wings, antennæ, legs, &c. are respectively contained. The investigations which will be described in this series of papers have convinced me that these terms and ideas are entirely erroneous. Such appendages or organs represent parts of the pupa, and I shall speak of them as pupal eyes, wings, antennæ, legs, &c. Although modified in shape, so that the imaginal organs can be contained within them, their form and structure are not identical with the latter, but are far more ancestral; they are remnants of a time when the last stage of metamorphosis in the ancestors of Lepidoptera was something very different from a butterfly or moth. The old terminology obscured the fact that the pupa has a morphological meaning of its own, and that traces of an extremely remote past can be deciphered by the study of its structure.

It is well known that the pupa can be dissected out of the skin of a mature larva many hours before the occurrence of normal pupation. Under these circumstances the pupal appendages are not soldered down by a thick coat of varnish, which hardens on exposure to the air, but stand out freely as evident legs, wings, &c. These appearances are nevertheless unaccountably described by many authors as the appendages of the *perfect insect*. Thus Swammerdam points out the method by which the pupa can be freed from the larval skin in *Pieris brassicæ*; he then says:—"This done, it is clearly and distinctly seen that within this skin of the caterpillar a perfect and real butterfly was hidden" ('Book of Nature,' ii. 26). This erroneous view is corrected by Sir John Lubbock *.

Professor Weismann's great discovery that the contents of the pupa of Diptera break down (histolysis) into nutrient fluids and lowly differentiated units, from which the imago is subsequently built up by a process akin to embryological development, has an important bearing upon the subject. If we examine a section of a pupal antenna or leg (in Lepidoptera) we shall find that there is no trace of the corresponding imaginal organ until shortly before the emergence of the imago. In the numerous species with a long

* 'Origin and Metamorphoses of Insects,' p. 67.

pupal period the formation of imaginal appendages within those of the pupa is deferred until very late, and then takes place rapidly in the lapse of a few weeks. This also strengthens the conclusion that such pupal appendages are not mere cases for the parts of the imago, inasmuch as these latter are only contained within them for a very small proportion of the whole pupal period.

A Classification of the various Features constituting the External Morphology of the Pupa.—Anticipating the results of investigations to be described in future papers, we shall find that the features which can be made out on the surface of a pupa may be grouped, according to their origin, under four chief heads:—

I. The first of these heads includes the essential and ancestral features derived from stages of a more ancient and continuous form of metamorphosis, and probably in some cases also transmitted from the ultimate, sexually mature, stage of a still earlier and simpler method of development. To this division belongs the general structure of the body: its segments, spiracles, limbs, wings, and probably antennæ; but not the details of these. Also, more specially, the pupal external generative organs and the crescent-shaped compound eye.

II. The second head includes those modifications of the general structure which are due to the development of a very different form within it. These modifications have determined the special form and, in some cases, sculpture of the wings, limbs, and antennæ, and have probably taken a much larger share in producing the present form of the pupal maxillæ. Inasmuch as a modification once wrought upon the pupa will often outlive the imaginal structure which caused it, we have some interesting proofs of former structural arrangements in the imago. These modifications due to the imago may be classified: (α) Those details which are common to a large number of pupæ, and in which the imaginal structures fit the corresponding parts of the pupa. This includes the vast majority of the details arranged under the second head. (β) Those obviously recent and exceptional modifications of the pupal structure which have been formed to accommodate a rapidly increasing imaginal structure. This includes the development of special outgrowths to contain the elongating imaginal maxillæ. (γ) Those details which, once impressed by an imaginal structure, have remained after the latter has shrunk and changed. This includes the large pectinated antennæ of female pupæ, giving rise to imagines with filiform antennæ. (δ) Those details which have followed the collapse of the contained imaginal structure, but have kept behind the latter, so that they form actual proofs of the shrinkage by showing to us that the imaginal structures were once a size larger. This includes the wings of female pupæ without the power of flight in the imago stage.

III. The third head includes those structures or marks which are due to the adult larva, and are of no morphological significance. These are either a mere concession to the mechanical condition of the process of pupation (scars of claspers and processes) or are due to the larval pigment still lingering unchanged in the pupal hypodermis cells.

IV. The fourth head includes those features which are due to the exigencies of pupal life as it now is. Such are the protective forms, markings, and colours of exposed pupæ; the colour of those that pupate in or upon the earth; and the rings of locomotive hooks

or spines possessed by those that pupate in tubular galleries cut in plant-stems or formed by rolled-up leaves.

Conclusions as to the Nature of Lepidopterous Metamorphosis.—Many writers have pointed out that the form of metamorphosis which consists of three sharply separated stages has been, in all probability, derived from a form in which many closely similar stages gradually led up to the final sexually mature form. The present metamorphosis of Lepidoptera &c. has been derived from the more ancestral form, still witnessed in the Orthoptera, by the omission of intervening stages, and also by the subsequent specialization of the final stage. In estimating the position of the lost stages it is most important to gauge the morphological relation of the pupa to larva and imago. Directly we attempt this comparison we find that, whatever morphological feature we adopt as a criterion, the position of the pupa is immensely nearer to the imago than to the larva. The great morphological break is between larva and pupa, an interval so wide as to dwarf the minor differences between pupa and imago.

At the change of skin which separates the two former stages we suddenly pass from a stage with simple eyes, without wings or external generative organs, into a stage with compound eyes, wings, and well-marked external generative organs. We may therefore safely conclude that many stages have been lost between larva and pupa.

At the time when these stages intervened the stage represented by the pupa was very near to the final form, if not the final form itself. This conclusion follows from the close morphological similarity of pupa to imago, and from the presence of distinct external generative organs.

The suppression of intervening stages has left the first or larval stage in an extremely ancestral condition, so that the larva in Lepidoptera is far more ancient than the first stage of those insects (Orthoptera), which still retain the more ancestral method of metamorphosis. These, therefore, have lost the early stages, while Lepidoptera &c. have lost all the stages intervening between the earliest and a very late stage.

It is probable that there are very few, if any, lost stages between pupa and imago, but the differences between them are due to subsequent specialization in the latter. Such specialization is frequently of quite recent date.

It is most interesting to inquire for the possible reasons which determined the loss of the intervening stages and the concentration of metamorphosis. It is quite clear that the loss is associated with, and in fact rendered possible by, the quiescence of the pupal stage, during which the tissues can be broken down (histolysis) and re-developed in the form of the imago. Thus the great morphological interval between larva and imago can be crossed without the need of intervening stages.

One interesting result of pupal quiescence and of histolytic change is the conclusion that there is no definite pupal stage, as far as the internal parts are concerned. The external parts will be shown to possess a clear and obvious morphological meaning, but a meaning which only becomes clear on the supposition that the internal parts possessed an equally definite significance at some time in the past. The sculpture on the surface of the pupa—its parts and their arrangement—point to a very definite stage; but beneath the surface we find either a gradual transition from larval to imaginal organs or the

larval tissues in a state of histolysis, from which the imago will be rapidly built up at a later period.

Sir John Lubbock * has suggested that the explanation of the quiescent pupal stage is to be found in the difficulty with which a *gradual* transition could be effected from the biting mouth-parts of the larva to the sucking mouth-parts of the imago. The intermediate form of mouth would be unfitted for either biting or sucking successfully; hence the necessity for a quiescent stage in which no food is taken, and during which the change can be accomplished.

The principle which underlies Sir John Lubbock's suggestion has probably been of very great importance for other structures as well as the mouth-parts, viz. the fact that specialization to the conditions of life in the final sexual phase of existence is thus readily attained without interfering with the great specialization of other antecedent stages. It would be of the greatest importance for the imago to be able to modify the methods by which it is adapted to its environment, without the cumbrous necessity for such modifications to be gradually introduced through a number of previous stages. This is the explanation of the quiescent pupal period adopted by the late F. M. Balfour †. A general support to this argument is to be found in the fact that the differences between larva and imago are far less in the Orthoptera, with their gradually progressive metamorphosis. The difficulty of specialization to different conditions in different stages has here been met by uniformity in the stages, so that one form of specialization is, with slight differences, available throughout.

I will briefly recapitulate the history of metamorphosis, which is, I believe, supported by the facts to be described in this and succeeding papers. One of the terminal stages of a gradually progressive metamorphosis, sufficiently advanced to possess well-formed external reproductive organs, became quiescent; this stage is largely preserved in the external morphology of the pupa. Histolysis and re-development of the final form then occurred, gradually displacing the stages immediately antecedent to the quiescent phase, which previously had been necessary in order to lead up to the latter and the final form to which it gave rise. Becoming more and more complete, the changes beneath the surface of the pupa gradually displaced the earlier stages until only the first, the larval stage, remained. The morphological intervals between pupa and larva and between pupa and imago have been subsequently widened by specialization to the conditions peculiar to each stage. The comparatively slight differences between pupa and imago are entirely to be explained in this way; for very few, if any, stages have been omitted between them.

These conclusions apply to the Lepidoptera, and probably with slight modification to other orders with a similar form of metamorphosis.

Part I.—The persistent Traces of Larval Structures upon the Pupa.

Before considering the number of abdominal segments and their relation to those of the larva, it is necessary to describe certain characters which will form very convenient

* 'Origin and Metamorphoses of Insects.'

† 'Comparative Embryology.'

aids in this part of the investigation. Not only is there the test of the spiracles, but owing to the manner in which the pupa is formed beneath the larval skin, almost any outgrowth of the surface of the latter leaves its impress upon the former. The scars thus produced are merely incidental and of no morphological significance, but they are extremely valuable as proofs of segmental identity. Other larval characters also appear on the surface of the pupa; their morphological meaning varies in the different cases.

1. *The Claspers.*—The posterior or anal pair of claspers are generally distinct in the pupa as convex cushion-like structures on each side of the anus. In certain individuals they may even retain the relative size and appearance which are characteristic of the larva (see Plate XX. figs. 8, 9, 10, showing different aspects of these parts in an extreme variety of *Smerinthus populi*). While the posterior claspers are thus represented by pupal structures and not merely by scars, the four anterior pairs only leave functionless traces upon the pupal cuticle. The first and second pairs are hidden beneath the fore wings, but on raising the latter (in pupæ placed in spirit immediately after throwing off the larval skin) the scars can be seen, and they may even be detected in living pupæ with exceptionally transparent wings (e. g. *Miselia oxyacanthæ*). The third and fourth pairs of claspers nearly always leave conspicuous scars upon the fifth and sixth abdominal segments (see Plate XXI. fig. 17 &c.).

2. *The Caudal Horn of Sphingidæ &c.*—This structure always leaves a scar on the pupa, even in those species in which it is feebly developed at the close of larval life (e. g. *Chærocampa elpenor* &c.). The scar is especially distinct in *Macroglossa stellatarum*. In most pupæ of Sphingidæ there is a well-marked depression on the eighth abdominal segment behind the scar left by the horn. This must be due to the bending downwards of the horn, which becomes quite horizonal before the larval skin is thrown off, so that the posterior edge of its base and the continuous adjacent larval cuticle are depressed and leave a permanent impress upon the yielding surface of the pupa. In *Smerinthus tiliæ* the general surface of the pupa is corrugated, but the scar of the horn is quite smooth. (See Plate XX. figs. 13 & 14 for the scar in this species, fig. 2 for an unusually prominent trace in *S. ocellatus*, fig. 4 for the normal scar, figs. 9 and 10 for the scar in *S. populi*.)

The blunt horn of *Endromis versicolor* also leaves a large scar, very different in appearance from the rest of the pupal surface (see Plate XXI. fig. 14 for an unusually conspicuous example).

Not only does a firm chitinous structure leave a distinct trace on the pupa, but soft elevations of the surface, like those seen upon the first and eighth abdominal segments of the larva of *Acronycta psi*, can be plainly detected upon the corresponding segments of the pupa (see woodcut 1, ×2, in which the pupa is seen from its dorsal aspect).

3. *Other Larval Structures which can be detected on the Pupa.*—The peculiar rough plate upon the dorsal surface of the anal flap of the larva of *Smerinthus tiliæ* is represented by the extremely rough dorsal surface of the terminal spine of the pupa, and is thus a valuable aid to the identification of these two structures. In the larva of *Pygæra bucephala* there is a "glabrous corneous black plate occupying the (dorsal surface of the) anal flap" (Newman, 'British Moths,' 1869, p. 220). This is represented on the anterior

dorsal part of the tenth abdominal of the pupa, which forms a deep furrow with the ninth abdominal. The edge of the furrow is crenated (see Plate XXI. fig. 6).

4. *Larval tufts of Hairs indicated on the Pupa.*—In the larva of *Orgyia pudibunda* there is a well-known tuft of hairs, the "tussock," upon each of the first four abdominal segments, and these are distinctly marked on the first three abdominal segments of the pupa, and perhaps to a slight extent on the fourth. On the other hand, there is a long pencil of hairs on the eighth abdominal segment of the larva, of which I could detect no trace in the pupa.

The larva of *Orgyia antiqua* also possesses four large tufts in the position described above, and the indication of these structures upon the first three abdominal segments is perhaps the most conspicuous feature of the pupa; but there is not the slightest trace of the fourth tuft. The three tufts in the pupa form squarish light-coloured patches, which are very distinct against the dark pupal cuticle, and are especially prominent and well defined in male pupæ, which are much blacker than females. The entire absence of any trace of the fourth tuft is very remarkable.

These appearances on the pupæ belong to a very different category from the merely mechanical scars, such as those produced by the caudal horn in Sphingidæ &c. and by

Fig. 1.

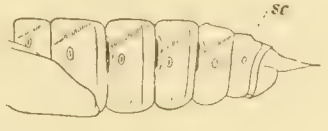


Fig. 2.

the four anterior claspers; for in the former case the pupa does not bear a scar of the larval tuft, but possesses a true hairy tuft itself. On the other hand, hairy prominences may be represented by mere scars, as in *Acronycta psi* (see woodcut 1).

Furthermore, in the pupa of *Saturnia carpini* distinct scars may be found which have been left by many of the brightly coloured hair-bearing warts of the larva. The scars are quite hairless and are much smoother than the rest of the pupa; they are rather depressed below the general surface.

5. *Larval Markings upon the Pupa.*—Sometimes the characteristic markings of the larva may be seen upon the pupa immediately after the skin of the former is thrown off, and these appearances may be fixed by placing the pupa in spirit and thus checking the darkening of the surface. The persistence of such colours depends upon the fact that the hypodermis cells of larva and pupa are the same; so that any pigment contained in them during larval life may remain unchanged after the pupal period has begun. Such colours are, of course, concealed in the living pupa by the opaque cuticle. I first noticed the persistence of larval colours in the freshly formed pupa of *Sphinx*

ligustri * (see woodcut 2, natural size, showing the posterior part of an undarkened male pupa from the left side). The purple borders of the stripes are seen to bear a relation to the segments similar to that borne during the larval stage. This is especially well seen in the border of the last stripe. In the larva the last white stripe crosses the seventh abdominal and enters the base of the caudal horn on the eighth; its border is, of course, just in front of it during this course. The border in the pupa crosses the same segment, and its long axis points towards the anterior part of the scar of the caudal horn (see woodcut 2, *sc.*). So also the relation of the coloured borders to the spiracles is just the same as that of the larva. The borders in the figure are more distinct than in the spirit-specimen from which it was drawn, because the surface of the latter has darkened to some extent upon the back, and the borders appear to be merely lines of especial darkening as compared with the adjacent surface, which they resemble in colour (brown). In another spirit-specimen of *Sphinx ligustri* (preserved for nearly two years) the stripes remain very distinct and still retain a purplish tint. On removing a portion of the cuticle and examining its under surface, it was at once seen that the colour of the borders is due to pigment in the adherent hypodermis cells, which can be detached with loss of the colour. It is thus certain that the constitution of the coloured stripes in the pupa is similar to that in the larva, while the dark surface of the former is entirely different and due to a darkening of the cuticle.

Similar facts are true of the pupa of *Acherontia atropos*. When examined immediately after pupation the purple stripes and small circular patches (which probably spread from the bases of shagreen dots) of the larva are distinctly seen through the undarkened pupal cuticle. I have also observed the light oblique stripes, with their dark green borders, of *Smerinthus populi* and of *S. ocellatus*, conspicuously appearing upon the surface just after pupation.

The importance of these observations in homologizing the larval and pupal segments and structures is well shown by the following example:—"In the green freshly exposed pupa of *Aglia tau* all the markings of the larva are very distinct, and the subspiracular line which forms so prominent a feature of the larva, and which is continued along each side of the anal flap to its extreme apex, is equally conspicuous in the pupa, and occupies an identical position in relation to the terminal anal spine, which in this species is blunt and covered with an immense number of irregular hook-like cuticular processes" † (see Plate XXI. fig. 16 for the general form of this part of the pupa). Hence the position of the marking affords valuable confirmation of the identification of the anal flap of the larva with the terminal spine of the pupa, to be further discussed below.

There is little doubt that the careful examination of freshly formed pupæ will prove that such markings are of very general occurrence.

* See Proc. Roy. Soc. vol. xxxviii. p. 278, in which this example is briefly described.

† Poulton, in Trans. Ent. Soc. Lond. 1888, p. 566.

Part II.—The Number of Abdominal Segments and their Relation to those of the Larva.

It is obviously necessary to determine these points before proceeding to the consideration of the external organs of reproduction, for the segmental relations of the latter are of the highest importance.

1. *The Number of Abdominal Segments in the Larva.*—There is no difficulty about the seven anterior abdominal segments, each of which bears a spiracle. Behind the seventh, however, there is a somewhat confused mass of segments, bearing a single spiracle on its anterior part; this spiracle is usually larger than those upon the other abdominal segments (see woodcut 4). This confused mass is sometimes described as a single segment and sometimes as two. Careful comparison with the pupa proves that it is certainly made up of three segments.

Woodcut 3, ×2, represents the posterior part of the larva of *Gonoptera libatrix*, as seen from the left side. The separation of the anterior, spiracle-bearing part of the mass of segments behind the seventh abdominal (vii) is extremely distinct in this larva, clearly forming the eighth abdominal segment (viii). Behind this there is a small ninth abdominal (ix), which is clearly separated off dorsally, although less distinct ventrally.

The pairs of dorsal bristles shown upon the eighth and ninth abdominal segments in woodcut 3 are obviously homologous with those on the anterior abdominal segments. In woodcut 4, ×9, the same parts are seen from the right side in the larva of a Pyrale, *Ephestia Kühniella*; the ninth abdominal is seen to be even more distinct than in woodcut 3, and to be clearly defined ventrally. In the larva of *Aglia tau* the independence of the ninth abdominal (and the tenth also) is strongly confirmed by the resemblance of the pair of dorsal tubercles to those upon the anterior dorsal segments *. The accurate representation of these parts in many South-American larvæ should be studied in the plates of W. Müller's 'Südamerikanische Nymphalidenraupen' (Fischer, Jena, 1886).

In the pupa, this ninth abdominal segment, although small, is as distinct as any of the others; see, for instance, woodcut 5, ×7, which represents the last three segments of a female pupa of *Pieris brassicæ*, seen from the left side: the same parts of the same pupa are seen from the dorsal aspect in woodcut 6, ×7. The distinct independence of the ninth abdominal is shown with equal clearness in most of the figures on Plates XX. & XXI.

The part behind this segment in the larva forms a tenth abdominal. This segment is separated into a dorsal portion (x′ in woodcuts 3 & 4), of which the posterior and lower part forms the anal flap, and a ventral portion (x), of which the anal claspers form the posterior and lower part; between the latter is the anus.

2. *The Relation of the Terminal Abdominal Segments of the Pupa to those of the Larva.*—The essential structure of the terminal parts of the vast majority of pupæ, as seen from the left side, is diagrammatically shown in woodcut 7. The identification of the various parts with those similarly numbered in the larva (woodcuts 3 & 4) is sufficiently obvious. The spiracle on the eighth abdominal is rudimentary in the pupa, although of exceptional

* See Poulton in Trans. Ent. Soc. London, 1888, p. 561; woodcut 4 is copied from plate xvii. fig. 9 accompanying that paper.

size in the larva. The identification of the terminal spine (x′) with the anal flap of the larva was published by Mr. W. H. Jackson in 'Forms of Animal Life' (1888, p. 153). I also find from my notes that I had independently arrived at the same conclusion. Important confirmation is afforded by the previously-described relation of certain larval structures and colours to those of the pupa. When a spine is absent, and the terminal part of the pupa is rounded, the part above the anus nevertheless corresponds to the larval anal flap (see Plate XX. fig. 27, Plate XXI. fig. 12, &c.). The rounded cushion-like structure (x) represents the left anal clasper of the larva, and bears a similar relation to the anus and dorsal part (x′). The proof of this identification is chiefly found in the previously described exceptional individuals in which this part retains the characters of the anal claspers (see Plate XX. figs. 8, 9, 10).

An examination of Plates XX. and XXI. will show that the condition represented in woodcut 7 is typical among pupæ. There are, however, certain species in which the

Fig. 3.

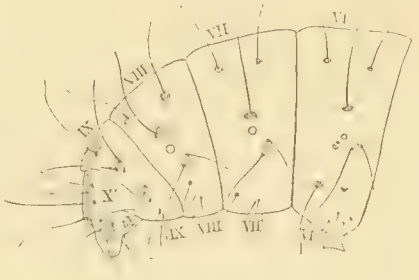


Fig. 4.

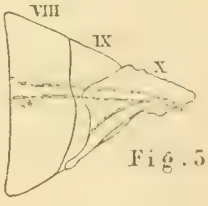


Fig. 5.

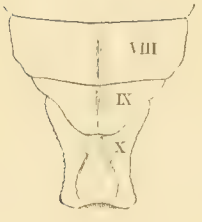


Fig. 6.

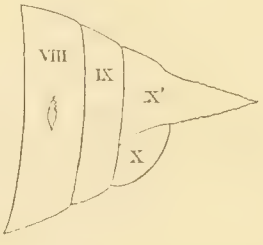


Fig. 7.

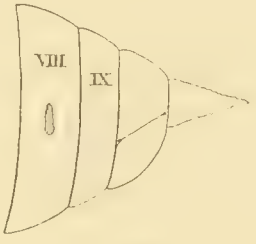


Fig. 8.

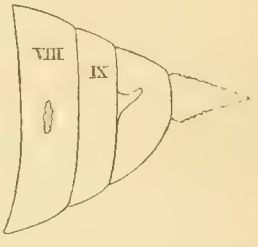


Fig. 9.

arrangement is somewhat different. Woodcut 8 represents diagrammatically one of these exceptions. An example is found in the pupa of *Aglia tau* (Plate XXI. fig. 16). The base of the terminal spine is somewhat constricted off from the rest of the tenth abdominal; the latter is divided into an upper and lower part by an oblique furrow. In certain Geometræ the same conditions are still more strongly marked; they are diagrammatically represented in woodcut 9. *Melanippe fluctuata* is a good example of this condition of the tenth abdominal (see Plate XXI. figs. 21, 22, 23), while *Amphidasis betularia* is transitional from this to the normal condition shown in woodcut 7 (see Plate XXI. fig. 20).

For a long time I believed that the tenth abdominal is in reality composed of two segments arranged, as in woodcut 7, one over the other. The arrangement shown in woodcut 9 is then explained by the supposition that the two component segments have assumed a more normal mode of succession, the anal segment (x in woodcut 7) becoming

the tenth, and separating the rostral segment (x′ in woodcut 7) as the eleventh from any contact with the ninth. Now, however, I think it is far more probable that the line of separation between the two parts of the tenth abdominal in woodcut 7 merely corresponds to the posterior part of the chink beneath the larval anal flap. The constriction which in certain pupæ encircles the base of the terminal spine would then cease to have any morphological significance; and this is also rendered probable by the fact that closely allied pupæ are altogether without it. The existence of a distinct line separating the supposed anal segment into a ventral and dorsal part in the condition represented in woodcut 8, and the indication of such a division in the more pronounced condition represented in woodcut 9, are also irreconcilable with the view that the terminal spine of these woodcuts represents the whole of the dorsal part of the tenth abdominal (x′ in woodcut 7).

We may therefore conclude that both larva and pupa possess ten abdominal segments; and even if this conclusion may require subsequent modification, the segmental relations of the external reproductive organs will be unaffected; for these structures only come into relation with the eighth, ninth, and the ventral (anal) part of the tenth abdominal segments.

Part III.—The External Generative Organs.

1. *Introductory and Historical.*—It is very remarkable that these organs have not been universally recognized, considering that thousands of pupæ are examined every year by entomologists and dealers, while the organs are easily seen in large species by the naked eye. There are other well-known tests of the sex of pupæ, depending on the difference between male and female antennæ, and upon the greater size of the abdomen in the female. But the former only applies to certain species (in which such a difference exists), and in these the antennæ of the pupæ are far more alike in the two sexes than those of the imagines of the same species (as will be shown in a future paper). The latter test is even more precarious. I therefore think that a study of the sexual differences on Plates XX. & XXI. will be of practical assistance in many departments of the subject. I have myself found the knowledge invaluable for many years, in the management of some experiments with larvæ in which it was necessary to ascertain and allow for hereditary tendencies. The pupæ of moths can be arranged according to their sexes far more quickly than the imagines of the same species, except when there is some obvious secondary sexual character, such as a difference in the colouring of the wings, &c. The organs are especially easy to distinguish, because pupæ are either entirely hairless, and generally smooth in the region of these structures, or possess minute or scanty hairs which do not cause any obscurity.

In the first edition, now out of print, of 'Forms of Animal Life' (1870) by the late Professor Rolleston, these words occur on p. 76, in a description of the pupa of *Acherontia atropos*:—"The ninth abdominal ring is marked by a depression on either side of the middle ventral line, the lines limiting which extend into the interspace between it and

the eighth abdominal segment, and indicate thus the normal position of the outlet of the generative glands." It is very difficult to see how a morphologist could have come so near the discovery of the external organs of reproduction and yet have failed to find them. The only possible explanation can be that, in the examination from which the above description was written, only a single pupa was made use of, or perhaps a small number, all of which happened to be of the same sex. It is quite clear that Professor Rolleston was speaking of a female pupa, for the organs are so obvious as distinct structures in the males that they could not have been passed over. Besides, the description quoted above is under no circumstances applicable to the male sex, while it does form an imperfect account of the appearance in certain female pupæ.

On the other hand, almost all entomologists who have carefully figured large pupæ exhibit in their drawings traces of the sexual characters which are sometimes accurately rendered in the case of the males. Thus, Lyonet figures (plate 39. fig. 3) a pupa of *Cossus ligniperda* with distinct male organs; Moore ('Lepidoptera of Ceylon') represents some large pupæ with indications of the generative structures. Burmeister, in his beautiful illustrations of the Lepidoptera of the Argentine Republic, also represents these parts. Thus his plate 18. fig. 11 represents a distinct male pupa of *Attacus hesperus*; while his plate 20. fig. 5 B is an equally distinct female pupa of *Ceratocampa imperialis*. In the description of these figures the position of the generative aperture is pointed out, but the sexual differences are not observed. Mr. W. F. Kirby has pointed out to me that there is a brief description of the male characters in Berge's 'Schmetterlingsbuch' (5th ed. 1876, p. viii):—"Bei dem männlichen Geschlechte auf dem vorletzten Ringe zwei durch einen Eindruck getrennte Höckerchen."

The morphology of the sexual structures is never attempted in these descriptions, and the figures are not sufficiently accurate or detailed to be of any value. This is especially true of the female sex, and I believe that an accurate figure of the female characters has never been published until now.

I first noticed the male organs in a pupa of *Sphinx ligustri* in the autumn of 1883, and at once began to examine a number of pupæ in order to find the characters of the opposite sex. This led me to undertake a careful comparison of the external generative organs in a large number of species, and finally to investigate all the features which make up the external morphology of this stage in Lepidoptera. This investigation has been intermittently continued up to the present date. Many of the figures on Plates XX. and XXI. were drawn during the autumn and winter of 1883 and early in 1884, namely, Plate XX. figs. 3, 4, 5, 6, 7, 12, 13, 14, 16, 18, 19, 22, 30, 31, 32, Plate XXI. figs. 4, 5, 6, 7. When I showed these figures to Professor Moseley, who took a very great interest in the work, and helped me with many kind suggestions, and with the results of his own observations upon pupæ, he expressed the opinion that the figures should be made on a much larger scale. The size of the other figures on the two Plates was adopted as the result of this advice. The smaller figures are of the natural size, and are useful in showing how much can be made out with the naked eye.

I have also to thank my friends Professor Meldola and Mr. W. White for kindly providing me with much of the material which has been made the subject of investigation.

Mr. White spent a great deal of time and trouble in examining pupæ and putting aside the most favourable specimens for my use. I owe the specimens from which the following figures were made to his kind assistance:—Plate XX. fig. 26; Plate XXI. figs. 9, 12, 13, 24, 25, 30, 34. Plate XXI. figs. 1, 2, 28, and 29 were drawn from Professor Meldola's material. Figs. 1 and 2 represent two especially favourable individuals selected after the comparison of a very large number.

2. *The Male External Reproductive Organs.*—A casual examination of a large pupa with the naked eye, or of a small one with the assistance of a low magnifying-power, at once shows the existence of two convex or flattened, roundish, oval, or trianguloid tubercles, placed one on each side of the middle ventral line, in the ninth abdominal segment. Careful examination throws some doubt upon the certainty of this segmental relationship. There is no doubt, however, that the organs always occur *in the zone of the ninth abdominal*, viz. in an area which would be included in the segment if the boundaries of the latter were produced in the direction indicated by their course in the dorsal and lateral regions. Between the tubercles is a furrow which generally becomes a deep pit in its central part; this pit is the ancient opening of the pupal *vas deferens*, and it now corresponds externally to the termination of the ducts internally.

It is furthermore possible by carefully selecting the pupæ, to find individuals which approach the condition of a perforate orifice. I have found *Smerinthus populi* the best species for this purpose, and on examining the organs from the *inside* of the empty pupa-case of a favourable individual, the lips of the depression are seen completely introverted, their internal surface having the black appearance and peculiar roughened texture which is characteristic of the exterior of the pupa, and with which it is of course continuous. The surface of the introverted funnel-like opening is covered with the same lustrous white layer which invests the whole interior of the cuticle, and which therefore is contrasted very sharply with the internal surface or lumen of the funnel. In this case the funnel is not closed at its deepest point, the lumen being obstructed a little higher up by the fusion and hardening of the semifluid substance into a solid plug immediately after pupation. When looked at from within, the sides of the sharply truncated funnel are quite free, recalling most vividly the condition in which the lumen was perforate throughout. The whole appearance from within, in fact, singularly resembles that of one of the superficial functional spiracles looked at from the same point of view. These have similar introverted lips, also sharply truncated, and showing the characteristic black surface which lines the lumen. The rudimentary eighth abdominal spiracle, on the other hand, is completely closed below, and the white surface lining the pupal cuticle is unbroken over it. It is very remarkable that this most ancestral generative organ should in certain cases retain such strong indications of the time when it was functional.

On the other hand, there are proofs of the ancestral nature of the male organs, and of their rudimentary condition, as far as the pupa itself is concerned. Thus the individual differences are very great in position and form, and in the degree to which the structures are developed. Furthermore, these organs are often asymmetrical when all other parts of the pupa are entirely normal. The asymmetry may be slight, as in Plate XX. fig. 11,

or pronounced, as in Plate XXI. fig. 34, or accompanied by marked deformity, as in Plate XX. fig. 26.

I have already stated that these organs appear to the naked eye to belong to the ninth abdominal. They are represented in this position in all figures which are of the natural size. When moderate powers are employed, together with the best means of illumination, and when the most favourable individuals are selected for examination, the organs appear to be surrounded by a furrow or line which is continuous on either side with the boundary between the ninth and tenth abdominal segments. This interpretation is supported by Plate XX. figs. 17, 18, 19, 21, and 23, and Plate XXI. fig. 2; that is to say, it is supported by all the most carefully drawn and highly magnified figures. In some of these, and especially in Plate XXI. figs. 12, 13, the organs appear to belong to an anterior median extension of the tenth abdominal.

I have not described the differences between these organs in the various species examined, nor the sculpture of their surface as compared with that of the adjacent area, because all this can be sufficiently made out by studying Plates XX. and XXI., and by reading the description of the figures.

3. *The Female External Reproductive Organs.*—These organs will also be described briefly, and the reader is referred to Plates XX. and XXI. for the details of specific and individual differences.

When the female pupa is examined with the naked eye, or with a low magnifying-power, the first character which arrests attention is an anterior median ventral wedge-shaped extension of the tenth into the ninth and sometimes into the eighth abdominal segment. In the majority of pupæ this feature is certainly more conspicuous than the generative apertures, and I observed and figured it long before I had detected the latter. It is interesting to note that Lyonet figured it in the pupa of *Bombyx rubi*, although without any other feature characteristic of the external reproductive organs. (See Lyonet, plate xxiv. fig. 12.) The median prolongation is especially conspicuous in the pupæ of Heterocera, but distinct traces of it can be often made out in Rhopalocera. The anterior median ventral margin of the ninth abdominal is also prolonged into the eighth for a variable distance, thus permitting the ventral prolongation of the tenth abdominal, or the generative aperture in connexion with its apex, to extend beyond the zone of the ninth abdominal (see page 199). The development of both these median processes varies extremely, not only in different species but in different individuals of the same species. Sometimes there is a median line which traverses the prolongation of the tenth abdominal, as in *Macroglossa stellatarum* (Plate XX. figs. 24 & 25). Sometimes the base of the prolongation appears to be separated from the rest of the tenth abdominal as in *Cossus* and *Zeuzera* (Plate XX. figs. 27 and 29; Plate XXI. fig. 1.) Any discussion as to the possible meaning of this feature is better deferred until after the consideration of the generative apertures.

There are two distinct generative openings in female pupæ—an anterior for the *bursa copulatrix*, and a posterior for the oviducts. The anterior is probably always associated with the eighth abdominal; it is more distinct than the other, and is usually provided with prominent lips. It is often slit-like, and extends from the posterior to the ante-

rior boundary of the segment, but is especially dilated at its posterior end (see Plate XX. figs. 15, 27, & 29). In a single individual of *Orgyia antiqua* (Plate XXI. fig. 10) it appears to be placed on a forward extension of the ninth abdominal into the eighth, but in another individual of the same species its position is normal (Plate XXI. fig. 9). We may safely conclude that the anterior generative opening is associated with the eighth abdominal segment.

The segmental relation of the posterior generative opening is far more difficult to determine. The two views as to its relationship appear to be about equally supported by the figures on Plates XX. and XXI. These are illustrated by woodcuts 10 and 11. In the former the posterior aperture is placed on the ninth abdominal, immediately in front of, but distinct from, the apex of the median prolongation of the tenth abdominal.

In woodcut 11 the aperture is placed on the apex of the prolongation itself, and therefore belongs to the tenth abdominal segment. In the majority of pupæ the opening occurs at the apex, and may or may not be considered to belong to it. This is the case, for example, with figs. 25 and 29 on Plate XX. Whether connected with the apex or not,

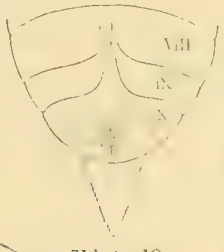


Fig. 10.

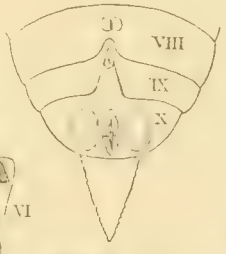


Fig. 11.

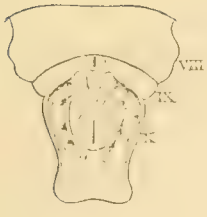
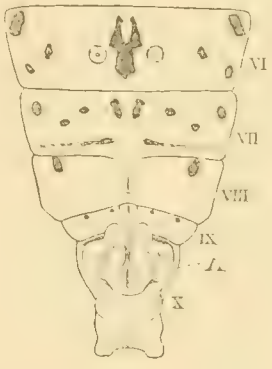


Fig. 12.

Fig. 13.



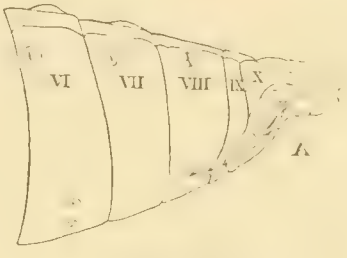


Fig. 14.

the aperture is always placed close to it. The posterior generative opening is often obscure and unrecognizable on the surface (*e. g.* Plate XX. fig. 1), and is often fused with the anterior aperture (*e. g.* Plate XX. fig. 8). Even when the two openings are fused and are prolonged into a common invagination, the double nature of the latter is shown by a furrow (Plate XXI. fig. 19). The posterior opening may be surrounded by prominent lips or by a swollen margin (*e. g.* Plate XX. fig. 15 ; Plate XXI. fig. 15), or it may be without these features (Plate XXI. fig. 3).

Although the female organs are not asymmetrical like those of the male, they are subject to even greater individual differences.

The pupæ of Rhopalocera possess essentially similar openings, but they are much more difficult to interpret because of the specialization in shape and the amount of surface sculpture. The ventral area of the ninth abdominal may even be entirely hidden (*e. g.* the male *Nemeobius lucina*, Plate XXI. figs. 32 & 33). Figs. 24–31 on Plate XXI.,

selected from very favourable individuals, prove that both male and female external generative organs of Rhopalocera are essentially similar to those of the Heterocera.

A still more typical example is afforded by the pupa of *Pieris brassicæ*, of which the male is shown in woodcut 12, ×7, and the female, from two points of view, in woodcuts 13 and 14, ×7.

The constancy and distinctness of the median prolongation of the tenth abdominal and the relation of its apex to one of the generative apertures indicates that it possesses some important morphological significance. Its shape suggests that it may represent an ancestral ovipositor formed as an anterior ventral extension of the tenth abdominal, and now fused to the pupa in its position of rest. Just as the male intromittent organ seems to be now only represented by the cuticle of that part of it which appeared on the surface when it was withdrawn, so the ancestral ovipositor is only represented by its external cuticular layer. The slight shifting of the generative opening, shown in woodcut 10, does not appear to disprove this hypothesis.

This hypothesis also explains the fact that there is a separate opening into the *bursa copulatrix*. Copulation would be almost impossible if the female aperture were placed on the apex of a conical process ; hence the necessity for a more accessible aperture. This arrangement having been once set up, would be retained after the disappearance of the necessity under which it originally arose, because of the many co-adaptations which would have been entailed in both sexes.

DESCRIPTION OF PLATES XX. & XXI.

Representing the characters of the terminal abdominal segments and the external reproductive organs of Lepidopterous pupæ.

(The abdominal segments are indicated by Roman numerals, the anus by A, the terminal spine by Sp. Other structural features are described with reference to their segments, and will be identified easily.)

Plate XX.

All the figures on this Plate represent the pupæ of Heterocera.

Figs. 1–7. The terminal abdominal segments of the pupa of *Smerinthus ocellatus*, showing the form of the external reproductive organs.

Fig. 1. ×7. The last three abdominal segments of a female pupa, seen from the ventral aspect. These segments, being the 8th, 9th, and 10th abdominal, are indicated by the numbers VIII., IX., X. The number VIII. is placed close to the last spiracle, rudimentary in the pupa, although functional in the larva. The rough terminal spine (Sp.) forms the extremity of the pupa; immediately in front of it (in the ventral line) is the anus (A), which is very distinctly indicated. The boundary between the 9th and 10th segments is prolonged forwards in the ventral line,

and the apex of the narrow triangular area which is thus formed represents the opening of the oviducts, invisible in this and most individuals of the species, although sometimes seen. Immediately in front of the apex of the above-mentioned area is the second or anterior generative aperture, that of the *bursa copulatrix*. This is very distinctly marked and is bounded laterally by prominent convex lips; it thus resembles the form of the male generative opening, but can be readily distinguished in that it is placed in the 8th abdominal segment, while the male aperture is situated in the 9th.

Fig. 2. ×7. The same pupa as seen from the right side. The posterior part of the seventh abdominal segment is shown in addition to those represented in fig. 1. The number VIII. is placed close to the dorsal projection which corresponds to the caudal horn of the larva, and which is very exceptionally developed in this individual. Immediately below the terminal spine (Sp.) is seen a curved line dividing the tenth segment into an upper and a lower (or anal) part.

Fig. 3. Natural size. The terminal part of a female pupa, as seen from the ventral aspect in a good light. The narrow pointed prolongation of the boundary between the ninth and tenth abdominal segments is distinctly seen, although neither of the generative openings were visible in this individual without magnification. The anus is distinct, and the cushions on each side of it (representing the anal claspers of the larva) are somewhat more prominent than usual.

Fig. 4. Natural size. The same pupa as seen from the left side. Beneath the reference letter VIII. a normal trace of the larval caudal horn is seen, indicating the exceptional character of fig. 2 in this respect. The trace consists of an anterior slight elevation formed by the soft surface of the pupa rising in the hollow interior of the horn, and a posterior slight concavity caused by the hinder margin of the base being depressed into the soft surface when the horn is bent backwards, becoming nearly horizontal, before pupation.

Fig. 5. Natural size. The terminal part of another female pupa, seen from the ventral aspect; the opening into the *bursa copulatrix*, with its lateral lips, is peculiarly distinct.

Fig. 6. Natural size. The terminal part of a male pupa, seen from the ventral aspect. The opening of the male ducts is distinctly seen, placed between the prominent lips upon the ninth abdominal segment.

Fig. 7. ×2. The ventral part of the ninth abdominal segment of the last pupa, showing the external reproductive organs more distinctly. The small pit in front of the organ is merely an accidental irregularity of the surface.

Figs. 8–11. The Terminal Abdominal Segments of the Pupa of *Smerinthus populi*.

Fig. 8. ×5·25. The last three abdominal segments of a female pupa, seen from the ventral aspect. The anus is concealed in this position, owing to the altogether exceptional size of the anal cushions, which, in this individual, even retain the form of the larval claspers. An elongated opening, surrounded by a raised border, is situated in the normal position in front of the apex of the narrow median prolongation from the tenth abdominal segment. The opening is seen to be divided in two; it is probable that the posterior division represents the mouth of the oviducts; the anterior division, of course, corresponds to the *bursa copulatrix*. The remarkable sculpture of the surface is indicated in the figure.

Fig. 9. ×5·25. The same pupa, as seen from the left side; the scar of the caudal horn is distinct, and the remarkable size and shape of the left anal cushion is better seen than in the previous figure.

Fig. 10. ×7. The same pupa, as seen from the left side and behind. The object of the figure is to show the relative positions of terminal spine, anus, and anal cushions. These bear precisely the same relation to each other as the anal flap, anus, and anal claspers of the larva, thus

supporting other observations which prove that these parts are respectively homologous. The external reproductive organs are seen obliquely, and therefore indistinctly in this and the last figure.

Fig. 11. ×4. The last three abdominal segments of a male pupa, seen from the ventral aspect. The male opening is distinct on the ninth abdominal segment; its direction is somewhat oblique, an irregularity which is not uncommon and probably follows from the extremely ancestral character of the organs. The lateral lips are flattened and marked with a sculpture which is different from that of the surface of the ninth abdominal segment. The anal cushions are of normal size, and serve as a gauge of the amount of abnormality of figs. 8, 9, and 10 in this respect.

Figs. 12–14. The Terminal Abdominal Segments of the Pupa of *Smerinthus tiliæ*.

Fig. 12. Natural size. The last four abdominal segments of a female pupa, seen from the ventral aspect. The median prolongation of the tenth abdominal is distinct, and the median slit in front of its apex represents one or both generative openings.

Fig. 13. Natural size. The last five abdominal segments of a male pupa, seen from the left side. The scar of the caudal horn is distinctly seen in profile. The generative organs cannot be seen, but the contour of the ventral part of the terminal segments is characteristic of the male sex.

Fig. 14. Natural size. The last three segments of a pupa (sex unnoted), seen from the dorsal aspect, in order to show the scar of the caudal horn from above.

Figs. 15–19. The Terminal Abdominal Segments of the Pupa of *Acherontia atropos*.

Fig. 15. ×9. The median ventral part of the last three segments of a female pupa. Both generative openings are distinctly visible in this individual; the opening of the oviducts is large and surrounded by a thickened V-shaped lip. It is placed in front of the apex of the median prolongation from the tenth abdominal, and appears to be clearly situated in an anterior median extension of the ninth abdominal segment. The opening into the *bursa copulatrix* is immediately in front of the other aperture, but separated from it by the boundary between the eighth and ninth abdominal segments. The opening extends forward as a narrow median slit as far as the anterior boundary of the eighth abdominal. The anus (A) is distinct on the tenth abdominal. The sculpture on the surface of the pupa and the various wrinkles &c. are carefully copied in the figure. These details required for their elucidation the most careful examination of an especially favourable individual in a very strong light. The general resemblance of the generative apertures to those of a well-marked individual of *Cossus ligniperda* is very striking (compare figs. 27 and 29).

Fig. 16. Natural size. The last three segments of a female pupa, seen from the ventral aspect. The generative apertures could not be made out without magnification, but the median prolongation was very distinct, far more so than in the last figure. In front of the anus (A), at the base of the median prolongation, there is the deceptive appearance of an opening with lips, due to wrinkles in the pupal case. The true generative openings never assume so posterior a position. In fig. 15 the true nature of the marking is apparent.

Fig. 17. ×9. The median ventral area of the ninth and the anterior part of the tenth abdominal segments of a male pupa. The figure hardly needs description as the male organs are quite typical. The lateral tubercles are roundish and somewhat flattened. The sculpture of the surface is represented. The exact relation of the male organ to the boundary between the ninth and tenth abdominal segments varies greatly in different species (compare figs. 11, 20, 21, 23).

Fig. 18. Natural size. The last three segments of a male pupa, seen from the ventral aspect, showing the appearance of the male organ when looked at without magnification.

Fig. 19. ×2. The median ventral area of the ninth and the anterior part of the tenth abdominal segments of the pupa represented in the last figure, showing the form of the male organs with greater distinctness. The three minute pits in front of the reproductive organ are probably merely an accidental conformation of the cuticle, for they are not found in other individuals (compare fig. 17).

Figs. 20, 21. The Terminal Abdominal Segments of the Pupa of *Sphinx ligustri*.

Fig. 20. ×4. The ninth and tenth abdominal segments of a male pupa, seen from the ventral aspect, showing the sculpture of the surface and the male reproductive organ. The latter is typical; its relation to the boundary between the ninth and tenth abdominal segments is better shown in the next figure, where it is seen to be nearly the same as in *Acherontia atropos* (fig. 17).

Fig. 21. ×26. The median ventral area of the ninth and adjacent parts of the eighth and tenth abdominal segments, showing the male organ and the surface sculpture very distinctly; the lateral tubercles are more closely applied than in *Acherontia atropos*. The pit in front of the reproductive organ is merely an individual peculiarity.

Figs. 22, 23. The Terminal Abdominal Segments of the Pupa of *Deilephila euphorbiæ*.

Fig. 22. Natural size. The last three segments of a male pupa, seen from the right side. The rudimentary spiracle and the scar of the caudal horn are seen on the eighth abdominal. The horizontal furrow which divides the tenth abdominal into a dorsal (rostral) and ventral (anal) part is unusually distinct. The division is rendered especially apparent because the dorsal part extends further anteriorly than the ventral, so that the ninth abdominal is narrow in front of the former and becomes suddenly broader in front of the latter.

Fig. 23. ×26. The median ventral area of the ninth and adjacent parts of the eighth and tenth abdominal segments, showing the male organ and the sculpture of the surface very distinctly. The male organ is somewhat asymmetrical. The two tubercles in front of it are probably an individual peculiarity.

Figs. 24, 25. The Terminal Abdominal Segments of the Pupa of *Macroglossa stellatarum*.

Fig. 24. ×4. The last four segments of a female pupa, seen from the ventral aspect. The functional spiracles on the seventh abdominal and the rudimentary spiracles on the eighth are represented in profile. The posterior part of the pupa gradually tapers into the sharp black rostrum. The anus (A) is distinct. The chief peculiarity of the pupa is the remarkable distinctness of both the female reproductive apertures. Although clearly seen in this figure, their relation to the segments is better studied in the more highly magnified fig. 25.

Fig. 25. ×40. The median ventral area of the last three segments of the pupa represented in the preceding figure. Of the very distinct reproductive openings, the anterior, leading into the *bursa copulatrix*, is seen to belong to the eighth abdominal, while the posterior, opening into the oviducts, apparently belongs to the ninth abdominal. The ventral prolongation of the boundary between the ninth and tenth abdominal is marked by a narrow pointed median band prolonged from the area round the anus (A). The latter is very distinct. The surface of the pupa is everywhere marked by circles with a dot in the centre of each, representing the (bristle-bearing) shagreen tubercles of the larva. The figure was drawn from a transparent object.

Fig. 26. The Terminal Abdominal Segments of the Pupa of *Sesia fuciformis*.

Fig. 26. ×14·5. The last two segments of a male pupa, seen from the ventral aspect. The object of the figure is to show the remarkable distortion of the male organs in the individual represented. This is not accompanied by any want of symmetry in the adjacent parts. The anus (A), the large rostrum, the form of the segments, except in the parts directly affected by their close proximity to the male organs, are all undistorted.

Figs. 27–32. The Terminal Abdominal Segments of the Pupa of *Cossus ligniperda*.

Fig. 27. ×7. The last three segments of a female pupa, seen from below, behind, and the left side. The reproductive organs were especially distinct in the individual figured. On the eighth abdominal the rudimentary spiracle and part of the dorsal semicircle of hooks are seen, together with the opening into the *bursa copulatrix*, which consists of a main aperture close to the posterior boundary of the segment and a narrow slit-like forward extension which reaches the anterior boundary. The semicircle of hooks on the ninth abdominal is also seen, together with the distinct opening into the oviducts, normally placed at the apex of the median prolongation of the tenth abdominal. On the tenth abdominal the anus is seen at A; the segment is divided, as in other pupæ, into a ventral (x) and a dorsal (x′) part. The semicircle of hooks on other adjacent abdominal segments is imperfectly represented on the tenth abdominal. In the median ventral line between the anus and the anterior prolongation there is a mark like that in a corresponding position on the female pupa of *Acherontia atropos* (fig. 16). In both pupæ the mark is due to wrinkles in the pupa-case, and is probably of no morphological significance.

Fig. 28. ×50. The median ventral area of the eighth, ninth, and part of the median prolongation from the tenth abdominal segments of the same pupa, as seen from within, from the right side and above. The main opening of the *bursa copulatrix* is seen to be prolonged into a laterally compressed funnel-shaped invagination of the cuticle, while the anterior extension is also distinctly marked by a long narrow ridge on the inner surface of the eighth abdominal. The opening of the oviducts is also marked by a very distinct invagination continuous posteriorly with the ridge-like boundaries of the median prolongation of the tenth abdominal. The small hemispherical elevation immediately in front of the last-named invagination is probably an individual variation.

Fig. 29. ×9. The median ventral area of the eighth, ninth, and tenth segments of the same pupa, as seen from the ventral aspect. Many of the appearances described in fig. 27 can be followed more accurately and in greater detail. The surface sculpture is carefully figured. The above-described mark in front of the anus (A) is clearly shown, together with a pit in the posterior part of the seventh abdominal. The latter structure is probably also devoid of morphological significance.

Fig. 30. ×4. The last two segments of a male pupa, seen from below and behind. The anus (A) is distinctly seen as a vertical slit in the ventral part of the small tenth abdominal. The spines which represent the semicircle of hooks on other adjacent abdominal segments are far less numerous than in the same part of the pupa shown in fig. 27, but, as in the latter, a single spine placed on each side of the anus is especially strong. The external reproductive organ is distinctly seen on the ninth abdominal; the lateral tubercles are flattened. Anterior to the organ there is a small flattened area with a different appearance from the rest of the surface. The semicircle of hooks on the ninth abdominal is seen, except in its dorsal part, which in this position is concealed by the tenth abdominal.

Fig. 31. ×2. The last three segments of the same pupa, as seen from behind. The semicircles of hooks

are distinct on the eighth and ninth abdominal segments. The rudimentary spiracle on the former and the male organs on the latter are also seen. The division of the tenth abdominal into a ventral (anal) and dorsal part is distinctly shown. Four small spines are placed on the latter part, as in fig. 27.

Fig. 32. Natural size. The last five segments of the same pupa, as seen from the right side. The semicircles of hooks on the sixth, seventh, eighth, and ninth abdominal segments are distinctly seen, together with the functional spiracles on the first two of these and the rudimentary spiracle upon the eighth abdominal. Some slight irregularities of the surface below the spiracle on the sixth abdominal represent the larval clasper. The two parts of the tenth abdominal and its imperfect semicircle of spines are also seen, together with the male organs on the ninth abdominal.

Plate XXI.

Figs. 1–23 represent Pupæ of Heterocera; the remaining figures represent the Pupæ of Rhopalocera.

Figs. 1, 2. The Terminal Abdominal Segments of the Pupa of *Zeuzera æsculi*.

Fig. 1. × 26. The median ventral area of the eighth, ninth, and the anterior part of the tenth abdominal segment of a female pupa. The resemblance to the pupa of *Cossus* is very marked (compare Plate XX. fig. 29), although the two reproductive openings are almost fused together. The surface-sculpture is represented. The anterior prolongation of the tenth abdominal is very distinct, as in *Cossus*, although in both these species its base is separated from the rest of the segment by a well-marked line of demarcation and by a difference in the character of the surface.

Fig. 2. × 26. The median ventral area of the ninth and the anterior part of the tenth abdominal segment of a male pupa. The male organ is beautifully regular; the lateral tubercles are somewhat flattened. The relation of the organ to the division between the ninth and tenth segments is carefully figured.

Figs. 3–6. The Terminal Abdominal Segments of the Pupa of *Pygæra bucephala*.

Fig. 3. × 5·25. The last three segments of a female pupa seen from the ventral aspect. The median prolongation of the tenth abdominal is unusually long, so that its apex and the inconspicuous opening of the oviducts is carried forward beyond the middle of the eighth abdominal: the opening of the *bursa copulatrix* is distinct and has a thickened border. The anus (A) is small. The shape of the double terminal spine is remarkable. The rudimentary spiracles are seen at the sides of the eighth abdominal. The surface-sculpture is represented.

Fig. 4. Natural size. A representation of the same parts (except that the seventh abdominal is also included) in another female pupa. The object of the figure is to prove that sexual characters are easily distinguished by the naked eye. A characteristic feature is afforded by the median prolongation of the tenth abdominal. The female sexual openings are only distinctly seen in the majority of individuals by means of a lens.

Fig. 5. Natural size. The ninth, tenth, and the posterior part of the eighth abdominal segments of a male pupa, seen from the ventral aspect. The male organs are seen to be distinctly recognizable without magnification. They are characteristic in form and position.

Fig. 6. Natural size. The same segments, as seen from the dorsal aspect. The object of the figure is to show a structure which corresponds to the black plate upon the dorsal surface of the larval anal flap. It is placed on the anterior dorsal margin of the tenth abdominal, and is valuable in homologizing the larval and pupal segments.

Figs. 7, 8. The Terminal Abdominal Segments of the Pupa of *Cerura vinula*.

Fig. 7. Natural size. The last four segments of a female pupa seen from the ventral and posterior aspects. The median prolongation of the tenth abdominal is very distinct. A dorsal semicircle of spines is seen on the ninth abdominal, together with the indications of a semicircle upon the dorsal division of the tenth abdominal.

Fig. 8. ×4. The median ventral area of the ninth and adjacent part of the tenth abdominal segments of a male pupa. The male organs are characteristic in position and in form, except that the lateral tubercles are flattened as in *Cossus* (Plate XX. fig. 30).

Figs. 9, 10. The Terminal Abdominal Segments of the Pupa of *Orgyia antiqua*.

Fig. 9. ×9. The median ventral area of the eighth, ninth, and the anterior part of the tenth abdominal segments of a female pupa. The two closely adjacent generative openings are enclosed between lateral lips which bear a striking resemblance to each other. The posterior opening is in a normal position at the apex of the median prolongation.

Fig. 10. ×9. The same parts of another female pupa. A comparison between this and fig. 9 illustrates the very great amount of individual variation in the characters of the external reproductive organs. The differences, are, however, somewhat exaggerated by the fact that this figure was drawn from a transparent object, while fig. 9 was drawn from an opaque object. The two openings are seen to be fused. The posterior appears to belong to the tip of the median prolongation of the tenth abdominal, the anterior to a forward extension of the ninth; the latter is an exceptional appearance.

Figs. 11–13. The Terminal Abdominal Segments of the Pupa of *Odonestis potatoria*.

Fig. 11. ×5·25. The last three segments of a female pupa seen from a ventral and posterior aspect. The anterior generative opening is very distinct and surrounded by lips; it is placed on the posterior part of the eighth abdominal. The posterior opening is probably represented by the median line immediately behind the anterior opening, but there is another mark placed more posteriorly, which may indicate its presence. The posterior end of the pupa is seen to be rounded.

Fig. 12. ×7·5. The last three segments of a male pupa, seen from a ventral and posterior aspect, but more posteriorly than in the last figure. Hence the division of the tenth abdominal into a ventral or anal (x) and dorsal (x′) part is clearly indicated. The latter is entirely without a terminal spine, but is covered dorsally by minute hooks. The male organ is better studied in the next figure. The anus (A) is nearly terminal.

Fig. 13. ×50. The median ventral area of the ninth and anterior part of the tenth abdominal segments of the same pupa, showing the male organ and its relation to the segments. The surface-sculpture is indicated. The male organ is seen to be somewhat asymmetrical; it is surrounded by a thickened margin rather than by the two lateral lips which are distinct in most male pupæ (compare fig. 2). The relation to the limits of the ninth and tenth segments is carefully figured.

Fig. 14. The Terminal Abdominal Segments of the Pupa of *Endromis versicolor*.

Fig. 14. ×7. The last three segments seen from the dorsal aspect. The surface of the pupa is extremely rough and richly beset with spines, which take a backward direction, and probably assist in emergence from the cocoon. The scar of the caudal horn is unusually distinct and large in this individual; it is placed, as in the pupa of Sphingidæ, upon the eighth abdominal.

Figs. 15, 16. The Terminal Abdominal Segments of the Pupa of *Aglia tau*.

Fig. 15. ×7. The last three segments of a female pupa, seen from the ventral aspect. The surface-sculpture is represented. The generative openings are unusually distinct and separate from each other. The anterior (*bursa copulatrix*) occupies the entire breadth of the eighth abdominal; its margin is very prominent, and much resembles the appearance of the male organ. The posterior opening (oviducts) similarly occupies the entire breadth of the ninth abdominal; its margin is not so distinct as that of the anterior opening. The median prolongation of the tenth abdominal is short and broad. The anus (A) is placed on an oval convex area. Behind this area the base of the terminal spine is separated from the anal part of the tenth abdominal by a distinct furrow. The spine is rough and bristles with irregularly twisted thread-like processes. Its ventral surface, seen in the figure, is characterized by a large oval concavity marked by concentric lines.

Fig. 16. ×7. The last four segments of a female pupa, seen from the right side. The functional spiracle on the seventh abdominal differs from the rudimentary one upon the eighth in its oblique position. All the visible functional spiracles are oblique like that shown in the figure. The first thoracic is the only concealed spiracle in the pupa, for even the prothoracic is clearly exposed to view. The tenth abdominal is distinctly divided into a dorsal (x′) and ventral part (x). The terminal spine (Sp.) is not, however, uninterruptedly continuous with the dorsal part, but is separated from the latter by a furrow which extends dorsally from that which was shown in the last figure, and surrounds the base of the spine. This tendency towards the separation of the terminal spine from the tenth abdominal is carried further in certain *Geometræ*.

Figs. 17–19. The Terminal Abdominal Segments of the Pupa of *Uropteryx sambucata*.

Fig. 17. ×2. The last five segments of a female pupa, seen from the ventral aspect. The traces of larval claspers are distinct upon the sixth abdominal. The morphology of the ventral area of the last three segments is confused by dark markings, and is better studied in the next figure.

Fig. 18. ×9. The last three segments of the same pupa, seen from the ventral aspect. The two generative openings are fused externally (compare the next figure), but the boundary between the eighth and ninth abdominal corresponds to the division between them. The base of the median prolongation from the tenth abdominal is marked by a triangular patch of dark pigment. The anus (A) is distinct; the terminal spines somewhat resemble those of *Melanippe fluctuata* (compare fig. 21).

Fig. 19. ×50. The ventral area of the ninth and adjacent parts of the eighth and tenth abdominal segments of the same pupa, as seen from within, from above, and the left side. The fused generative openings are seen to be invaginated to a considerable depth in the form of a long compressed ridge. The ridge is distinctly divided by a furrow continuous with the boundary between the eighth and ninth abdominal, indicating its essentially double nature. The relation of the posterior part of the ridge (the part which receives the oviducts) to the boundary between the ninth and tenth abdominal and to the median line along the latter seems to support the opinion that the posterior generative opening is associated with the median prolongation of the tenth abdominal.

Fig. 20. The Terminal Abdominal Segments of the Pupa of *Amphidasis betularia*.

Fig. 20. ×5·25. The last seven segments of a male pupa, seen from the right side. The dark bands on the posterior part of the fourth, fifth, and sixth abdominals indicate a peculiar texture

associated with the fact that motion is possible only at these intersegmental junctions. The rudimentary spiracle on the eighth abdominal forms a great contrast with those on the anterior segments. The junction of the terminal spine with the tenth abdominal is marked by a line. An oblique furrow extending posteriorly into the tenth abdominal probably represents an incomplete division into a dorsal and ventral part.

Figs. 21–23. The Terminal Abdominal Segments of the Pupa of *Melanippe fluctuata*.

Fig. 21. ×26. The last four segments of a female pupa seen from the ventral aspect. The boundaries of the median prolongation of the tenth abdominal are indistinctly visible and disappear towards the apex. This is a result of the polished surface of the pupa. Towards the posterior boundary of the eighth abdominal, the two generative openings are distinctly visible and are almost fused. It is impossible to feel any certainty as to the segments to which they belong, in this species. The anus (A) is very distinct and situated on a raised oval area. The terminal spine (Sp.) is distinctly segmented off from the tenth abdominal; it bears four bristles, the two central ones being stouter and larger than the others.

Fig. 22. ×14·5. The last four segments of another pupa (sex unnoted), seen from the dorsal aspect. The separation of the base of the spine from the tenth abdominal is very distinct. The median dorsal part of the anterior margin of the latter segment is extremely irregular.

Fig. 23. ×26. The last four segments of the female pupa represented in fig. 21, as seen from the right side. The furrow at the base of the terminal spine is very distinct. There is an oblique furrow extending posteriorly from the anterior margin of the tenth abdominal, as in the pupa of *Amphidasis betularia* (compare fig. 20).

The remaining Pupæ figured on Plate XXI. are those of Rhopalocera.

Figs. 24, 25. The Terminal Abdominal Segments of the Pupa of *Papilio podalirius*.

Fig. 24. ×7. The last three segments of a female pupa, seen from the ventral aspect. In this and the next pupa the surface-sculpture has been carefully figured. The opening of the *bursa copulatrix* is distinct on the eighth abdominal; there is a distinct median prolongation from the tenth abdominal, and the posterior generative opening is probably represented by the median line along its anterior part. The anus (A) is distinct, and there is a flattened area in front of it which terminates anteriorly in a raised rounded border overhanging the median prolongation of the tenth abdominal, and forming a very characteristic appearance.

Fig. 25. ×7. The same parts in a male pupa, seen from the same direction. The male organs are distinct and characteristic in form and position.

Figs. 26, 27. The Terminal Abdominal Segments of the Pupa of *Papilio machaon*.

Fig. 26. ×7. The last three segments of a female pupa, seen from the ventral aspect. The generative openings resemble those of *Papilio podalirius* (fig. 24). The position of the posterior opening on the median prolongation of the tenth abdominal is more distinct than in the latter pupa. The raised border in front of the anus (A) exhibits a tendency towards division into two parts. The part of the pupa represented in the figure is somewhat asymmetrical.

Fig. 27. ×9. The median ventral area of the ninth and adjacent parts of the eighth and tenth abdominal segments of a male pupa, seen from the ventral aspect. The male organs are distinct and characteristic. The raised border overhanging the male organs is not divided so deeply as that represented in the last figure.

Figs. 28, 29. The Terminal Abdominal Segments of the Pupa of *Ornithoptera minos*.

Fig. 28. ×4·25. The last four segments of a female pupa, seen from the ventral aspect. The anterior generative opening is distinct upon the eighth, and the posterior upon the ninth abdominal segments. Markings which can be easily distinguished from the surface-sculpture form the distinct boundaries of lips, as in the anterior opening of *Papilio* (compare figs. 24 and 26). The raised border overhanging the ninth abdominal is very broad, but strongly resembles that of *Papilio*. The close affinity between *Ornithoptera* and *Papilio* is proved by such resemblances between the pupæ. The terminal attachment is seen to be far stronger in the former, being related to the greater size and weight of the pupa.

Fig. 29. ×4·25. The same parts of the same pupa, as seen from the right side. The rudimentary spiracle upon the eighth abdominal is seen to be much smaller than the functional one upon the seventh. The tenth abdominal is clearly divided into a dorsal and ventral (anal) part. An immensely strong cable of black silk hangs from the hooks beneath the posterior extremity of the former, while the anterior extremity of the latter is formed by the raised border overhanging the ninth abdominal.

Fig. 30. The Terminal Abdominal Segments of the Pupa of *Gonepteryx rhamni*.

Fig. 30. ×9. The last three segments of a female pupa, seen from the ventral aspect. The anterior generative opening is large and distinct, occupying the whole breadth of the eighth abdominal. The outline of the large lateral lips is V-shaped. The posterior opening seems to be placed in the apex of the median prolongation of the tenth abdominal, while the ventral part of the ninth abdominal does not appear upon the surface of the pupa. In this respect the pupa resembles *Papilio* (compare figs. 24 and 26). The anus (A) is small but distinct; the area around and in front of it terminates anteriorly in a median and two lateral processes, the latter being spine-like. The hooks for attachment are placed upon a curved area below the posterior end of the pupa.

Figs. 31–33. The Terminal Abdominal Segments of the Pupa of *Nemeobius lucina*.

Fig. 31. ×9. The ninth and tenth abdominal segments of a female pupa, together with the median ventral area of the sixth, seventh, and eighth abdominal segments, seen from the ventral and posterior directions. The hairs on the surface of the pupa are not represented in the figure. The anterior generative opening is distinct; it is in the form of a slit occupying the median ventral line of the eighth abdominal. The posterior opening could not be identified, and only a very small part of the ventral area of the ninth abdominal could be seen on the surface, owing to the extension forward of the raised border, forming the anterior part of the tenth abdominal. The anus (A) is distinct, and the tenth abdominal is clearly divided into a dorsal (x′) and ventral (anal) part (x).

Fig. 32. ×9. The last five segments of a male pupa, seen from the ventral aspect. The hairs are represented, but they should be of rather greater proportionate length. The scars of larval claspers are seen on the sixth abdominal. The anterior border of the tenth abdominal completely conceals the ventral part of the ninth, so that the male organs cannot be seen upon the surface.

Fig. 33. ×26. The last three segments of a male pupa seen from behind and the right side. The hairs are not represented. The manner in which the ventral part of the ninth abdominal segment is overlapped by the tenth is clearly shown. The dorsal (rostral) part of the tenth abdominal (x′) is separated into three subdivisions by furrows. The rudimentary spiracle is distinct on

the eighth abdominal. The raised anterior border of the ventral (anal) part of the tenth abdominal (x) is very like that of *Papilio* and *Ornithoptera*, and exhibits traces of median division as in certain species of these genera (compare figs. 26 and 27).

The interpretation of the appearances in this species (*N. lucina*) presented great difficulty, but I believe that the solution suggested in figs. 31–33 is correct.

Fig. 34. The Terminal Abdominal Segments of some Rhopalocerous Pupa, probably that of *Arge galathea*.

Fig. 34. ×14·5. The median ventral area of the last three segments of a male pupa. The anus (A) is distinct. The male organ is typical in form and position, except that it is twisted into an oblique direction. The object of the figure is to show the lack of symmetry in this structure in a pupa which was otherwise well formed. The uncertainty as to the species represented is therefore of comparatively small importance.

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Part	XIII. 1884.	0	6	0	0	4	6
Part	XIV. 1885.	0	6	0	0	4	6
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Part	IX. 1880.	1	0	0	0	15	0
II. Part	I. 1881.	0	12	0	0	9	0
Part	II. 1882.	0	5	0	0	3	9
Part	III. 1883.	0	10	0	0	7	6
Part	IV. 1883.	0	3	0	0	2	3
Part	V. 1883.	0	3	0	0	2	3
Part	VI. 1884.	0	13	6	0	10	0
Part	VII. 1884.	0	9	6	0	7	0
Part	VIII. 1884.	0	10	0	0	7	6
Part	IX. 1886.	0	7	0	0	5	0
Part	X. 1887.	0	3	4	0	2	6
Part	XI. 1886.	0	6	0	0	4	6
Part	XII. 1886.	0	8	0	0	6	0
Part	XIII. 1887.	1	7	0	1	0	0
Part	XIV. 1887.	0	7	0	0	5	0
Part	XV. 1887.	0	10	0	0	7	6
Part	XVI. 1888.	0	2	6	0	2	0
III. Part	I. 1888.	3	12	0	2	14	0

SUGGESTIONS AS TO THE MEANING OF

THE SHAPES AND COLOURS OF THE MEMBRACIDÆ

IN THE

STRUGGLE FOR EXISTENCE

BY

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SUGGESTIONS AS TO THE MEANING OF THE SHAPES AND COLOURS OF THE MEMBRACIDÆ, IN THE STRUGGLE FOR EXISTENCE

In studying the meaning and use of insect colour and form it is deeply interesting to compare broadly the two great divisions of the Rhynchota. The Heteroptera (Hemiptera) are obviously, as a whole, a specially protected group, commonly defended by taste or smell from large numbers of insect-eating animals. Warning or aposematic colours and patterns abound among them, while their movements are such as to promote the conspicuous effect of strongly contrasted tints. Groups of species in the same locality often possess similar aposematic colours, thus enabling their young and inexperienced enemies to learn and remember the appearance of unpalatable forms, with a comparatively small waste of life. Such resemblances are often spoken of as Müllerian Mimicry, after the naturalist who first suggested the benefits which arise from facilitating the education of foes. They may also be called by the more descriptive title "Common Warning," or "Synaposematic" colours. For it is clear that in such cases we have to do with the useful possession of warning colours in common rather than with the benefits conferred by "Protective Mimicry" (Pseudaposematic colours) as defined by H. W. Bates. By these latter resemblances a rare, much persecuted, palatable form is believed to be mistaken by enemies for an abundant species, well known and avoided because of some special mode of defence. Good examples of S. African Heteroptera with common warning colours have recently been described and figured by Mr. Guy A. K. Marshall (*Trans. Ent. Soc. Lond.*, 1902, p. 537).

When we find the Heteroptera resembling specially protected insects of other Orders, such as the conspicuous distasteful groups of Coleoptera: the *Lycidæ* (l.c. p. 515), the *Cantharidæ* (p. 518), the *Coccinellidæ* (p. 520), or the aggressive

Hymenoptera (p. 535), the question at once arises as to whether the likeness is to be explained by the theory of H. W. Bates or by that of Fritz Müller. The evidence for the existence of a widespread distastefulness among the Heteroptera strongly suggests the latter interpretation rather than the former. It is hardly necessary to remark that there are numerous exceptions to these broad statements. Beautiful examples of cryptic defence are well known in the Heteroptera even of this country. Nevertheless the group, as a whole, is characterised by the abundance and conspicuousness of aposematic and synaposematic combinations of colours, the resemblances to insects outside the group falling probably into this latter category.

The Rhynchota Homoptera are sharply contrasted with the Heteroptera, cryptic colours and patterns being relatively common among them, although some of the divisions are very conspicuous and probably aposematic. When resemblances to other insects occur they are probably to be explained as Batesian (Pseudaposematic = Protective) Mimicry, when the most nearly allied non-mimetic species of Homoptera possess a cryptic defence (Protective Resemblance), as Müllerian (Synaposematic = Common Warning Colours) when the allied species are conspicuous with aposematic or warning colours.

Allusion must be made to the special and curious defence by a waxy secretion which is common in the Homoptera. The method may be compared to the defensive silken walls of the cocoon in other insects, while the long trailing filaments of wax borne by certain species of Homoptera may play the same part as the "tails" on the hind wings of many Lepidoptera, or the "tussocks" of hair on some of their larvæ—all these probably acting as directive structures which divert the attention of an enemy from the vital parts.

The deeply interesting section of the Homoptera which forms the subject of the present memoir has an important bearing upon the bionomics of insect colouring, affording as it seems to the present writer, one of the most convincing of all the arguments which have been adduced in support of an interpretation based upon the theory of natural selection.

The *Membracidæ*, as a whole, appear to depend chiefly upon Protective Resemblance, concealment being effected by likeness to various vegetable structures. Examples of resemblance to other insects—ants, beetles, &c.—are found in many species, but the interpretation of these as Batesian or Müllerian is better considered after the examples themselves have been dealt with.

Resemblances to other insects and to the vegetable environment are, of course, extremely common throughout the Insecta, but nowhere (except in a few Orthoptera) are they produced in the same manner as in the *Membracidæ*. The deceptive disguise of other insects is manifest in various parts of the body, and often in many parts

together : in the *Membracidæ* the disguise is chiefly borne and often solely borne by the pronotum alone. The marked resemblance to ants in the genus *Heteronotus*, the strange and remarkable shapes which we should probably recognise as cryptic if we saw the living insects in their natural environment—these are borne by a mask which is a development from a relatively small part of the organism. The Membracid, as a whole, bears not the slightest resemblance to ant or thorn or bark, but it is covered by a shield which does bear a striking resemblance in some species to the first, in others to the second, in others again to the third, of these objects.

Those who oppose the interpretation based on natural selection are therefore faced by the question—how, except by selection, can it be conceived that the variations of shape in the pronotal shield of an insect can have been guided into the superficial resemblance to an ant, while variations in the whole body-form of another have assumed the same appearance, while in a third the likeness is indicated by colour alone, resulting in the invisibility of those parts which would interfere with the resemblance? The attainment of the same end by entirely different means affords strong support to the opinion that the end is advantageous. On any other hypothesis as yet put forward it is a meaningless coincidence that the model suggested in each of these three different ways, is the same specially aggressive and well-known insect. This argument was first suggested by the present writer at the Toronto meeting of the British Association in 1897 (Report of the Meeting, page 692) and was further developed with the aid of illustrations in the *Journal of the Linnean Society* (Zoology, Vol. XXVI., pp. 588–595).

In the following pages I have employed the word "mimicry" to indicate resemblances to other species of animals. Likeness to plant structures, &c., for the purpose of concealment I have invariably called "cryptic" or "protective resemblance." Among the *Membracidæ* such concealment is always "procryptic," for the purpose of defence; although anticryptic or aggressive resemblances to plants are well known in insects, especially in the flower- and leaf-like mantides (see page 153).

In discussing the effect of hereditary bias towards particular colouring (see page 200) I was considering only the cases of insects in which each individual possesses a power of special adjustment to two or more of its possible environments. For example the larvæ of the moth *Amphidasis betularia* have the power of becoming black on a plant with black twigs, green when the twigs are green, white when they are glaucous, &c. (*Trans. Ent. Soc. Lond.*, 1892, pp. 326–360). This individual adaptability and freedom from bias is clearly advantageous. If, for example, the effect of green shoots persisted in the next generation it would be injurious to the great majority of the larvæ, for the parent moth generally lays her eggs on plants with dark twigs. The same argument applies to the smaller differences which distinguish

the dark twigs of various trees from each other; for these also are reproduced upon the larvæ. Thus Mr. Arthur Sidgwick has shown that the caterpillars, when found upon birch and oak, differ, as do the dark twigs of these two trees (l.c. p. 360). It has not yet been shown that any Membracid has this power of adjusting its colour to two or more environments, so that my argument does not at present apply to these insects. If, however, it is at all possible to breed them it would be deeply interesting to ascertain whether any such adaptability exists. The best chance of success would be afforded by experiments upon well-concealed species of which the individuals are known to vary greatly, but always in the direction of some one of their natural environments.

It is now proposed to make a brief survey of the material illustrated in this monograph and to attempt to suggest the possible bionomic meaning of the appearances into which the enveloping pronotal shield is fashioned in the various groups of species.

Commencing with the sub-family *Membracinæ*, the genus *Membracis* includes the species with the pronotum high and compressed from side to side, and coming to a sharp thin edge like a leaf. Beneath this leaf-shaped structure, which is dark, mottled with white or yellow, the head, wings, and legs of the insect are seen (see Plates I. and II.). Inhabiting the same part of the world, tropical America, in which alone this genus is found, are ants of the genus *Œcodoma* (Sauba ants). The ants live upon fungi which they cultivate in galleries underground, growing them upon a paste of bitten-up leaves. To provide this soil streams of ants are continually passing to the formicarium, each bearing a piece of leaf held vertically in its mandibles and thrown back over the body. The ants are extremely common, so much so indeed that certain kinds of imported trees cannot live in that part of the world, and the processions of leaf-carriers as well as the single ants are among the most familiar and characteristic of sights. The *Membracidæ* on the other hand are scarce. Green leaves are not the only things sought out by the ants; they have been seen carrying off parts of the wings of butterflies, as well as leaves discoloured in various ways.

It seems possible that the rare *Membracis* with its high laminar pronotum may pass undetected among the numerous leaf-carrying ants which are partially concealed beneath their burdens in much the same manner. Furthermore the pronotum is about the same size as the fragment of leaf and the Membracid as some of the forms of the worker ants.

I do not desire to press this interpretation with confidence, but merely bring it forward as a suggestion. I venture to hope that naturalists visiting tropical America will observe whether the leaves carried by the ants do not sometimes possess the curious parti-coloured appearance of the Membracid pronotum.

The larvæ (Plate II. Fig. 4*a*) of the species of this genus are described by Canon Fowler in the *Biologia Centrali-Americana* as "very curious, being of much the same shape as the perfect insect, but formed of separate upright narrow plates of different heights." That these larvæ protectively mimic the leaf-carrying ants is highly probable, far more so than in the case of the mature insects; for we have here the testimony of a biologist who observed the living insect in its natural habitat. Mr. W. L. Sclater, on returning from his journey to British Guiana in 1886, told me that on one occasion while collecting insects by shaking the branches of a tree over a sheet, his native servant, whom he described as a very acute observer, mistook one of these Membracid larvæ for a "Cooshie ant" carrying its fragment of leaf. Mr. Sclater brought the larva home, and it is figured in a short paper communicated to the Zoological Society (P.Z.S. 1891, p. 462, Plate XXXVI.). In this case we know that the thin flattened body is of a green colour like a leaf, while beneath it the legs and head are brown like the part of the ant which is not concealed by the leaf.

It is of great interest that the remarkable forms of larva and perfect insect—although superficially alike—are produced in entirely different ways. In the larva the thin flattened shape is due to compression of the whole of the body rings behind the head, and every one of them contributes to form the sharp dorsal line which so much resembles the serrated margin of a leaf or a jagged edge gnawed by the mandibles of the ant. The same sharp line, forming a smoother sweep, is, in the perfect insect, made up by the edge of the pronotum alone. If, therefore, both larva and imago resemble leaf-carrying ants, the part representing the leaf is made up by all the segments in the one, and by the pronotum alone in the other. Both larvæ and imagos probably live in the trees which the ants frequent for the purpose of cutting the leaves.

At first sight it seems very difficult to account for the origin of such a case of protective mimicry, if indeed the interpretation here suggested be correct. It is, however, probable that the thin green body-form was gradually evolved to promote concealment among leaves, and that the few special details which suggest the ant were subsequently added.

It is also of much interest that forms superficially resembling *Membracis* should be found in the Orthopterous genus *Xerophyllum* (Plate I.) where the dead-leaf-like appearance is not confined to the pronotum but is further carried out in the legs and head. The resemblance is clearly incidental and syncryptic.

The appearance of the genera *Phyllotropis* and *Cryptonotus* (Plates III. and IV.) is not unlike that of *Membracis*. In the genera *Enchophyllum* and *Enchenopa* (Plates IV. to VI.) the pronotum is prolonged into a horn anteriorly, in some species bent,

and in others straight. The shape and appearance probably promote concealment in trees and shrubs. *Tropidocyta* and *Leioscyta* (Plate VII.) are very similar to the above-named genera, but the pronotum is not foliaceous and is rounded or very obtusely pointed anteriorly. They are probably adapted to concealment among plants, resembling buds or the irregularities of rough bark.

The irregular rounded species of the genus *Tylopelta* (Plate VII.) would also be well concealed on rough bark, while on the ground they would resemble seeds, the excrement of larvæ, or small lumps of earth. Some of the elongated and generally curved forms of *Philya* and *Scalmophorus* (Plate VIII.) suggest small bits of stick, of which the projecting end appears to be broken off, while the species in which the pronotal horn is pointed anteriorly perhaps represent thorns. The greatly varied shapes presented by the genus *Hypsoprora* (Plates VIII. and IX.) suggest protective resemblance to vegetable growths of various kinds—buds, roughened bark, irregular or winged seeds.

The next genus, *Bolbonota* (Plates IX. and X.), contains small, dark, roundish insects closely resembling seeds, also small lumps of earth, &c. They would be well concealed upon rough bark. The pronotum, which is the only part seen when the insect is looked at from above, is rounded and broad and its surface deeply sculptured. In the position of rest the legs are folded close to the body, and thus help in the disguise. Canon Fowler remarks in the Biologia: "No insect could look more unlike the foliaceous species of *Membracis*, and yet, so gradual and so complete is the transition through intermediate species, that the older authors included them under the same genus." *Bolbonotodes* (Plate X., Fig. 9) includes an allied insect, which is also seed-like in appearance.

Pterygia, with its remarkable winged processes and strongly roughened surfaces (Plates XI.–XIII.), appears to be undoubtedly cryptic, resembling some of the forms of the vegetable environment. What these exact forms are must be determined by naturalists upon the spot, but lichen, winged seeds, and the irregularities of extremely rough bark may be suggested. Almost the same words may be used of the astonishing forms presented by the remarkable genus *Sphongophorus* (Plates XIII.–XV.), some of which seem clearly to suggest lichen, and others the excrement of birds or other animals, as is indicated by Mr. Buckton (see description of Fig. 4 on Plate XIV). A possible resemblance to galls should also be taken into account. The remarkable inflated part of the pronotum of *Sphongophorus inflatus*, figured by Canon Fowler on Plate III., Fig. 5, of his monograph in the Biologia, bears a peculiar sculpture which may be gall-like. The species are, as Canon Fowler writes in the Biologia, "among the most extraordinary of the *Membracidæ*, and, in fact, there are few insects which assume more curious forms."

I can imagine no more interesting study for the tropical American naturalist than the attempt to discover the meaning of these remarkable shapes by careful observation of the living insects under as many different conditions as possible, and especially during the periods of prolonged rest and entire quiescence. It is during these latter times rather than in periods of activity (including the frequently repeated brief intervening pauses) that the true meaning of a cryptic appearance and instinct is to be sought. Thus insects which are about by day should be watched going to rest, and then observed from time to time during the hours of darkness; conversely, nocturnal forms should be tracked and then watched by day. Insects which require the hottest sunshine should be studied in exceptionally cold cloudy weather, &c. In thus looking out for the times of complete repose, when a cryptic appearance is of the highest importance, Mr. Nelson Annandale's observations in Malacca (1899–1900) should be remembered. He informs me that insect-eating animals retire to rest during the hottest hours of the day, and that at this very time insects, including such cryptic forms as the stick-like Phasmids, move about freely, assume positions and occupy environments in which they are quite conspicuous. Any observer who neglects to take account of this aspect of the question can only commit himself to random criticism like that which has been often urged against the interpretation of the wonderfully cryptic underside of butterflies of the genus *Kallima*. Because these insects have been seen in conspicuous positions and attitudes during the short pauses between successive flights it has been argued that the dead-leaf-like underside cannot be for concealment. Let any such observer watch a *Kallima* to rest at the close of a day's active flight, and his notes and criticism on the subject will have value. As it is we are only confronted by the aimless objection that an adaptation developed for one purpose is not made use of for another, and with this conclusion the movements and attitudes of our English *Vanessidæ*, with their cryptic undersides, had long ago familiarised us.

We now reach the second sub-family of Mr. Buckton's classification, the *Hoplophorinæ*. The cryptic resemblance to thorns in the genus *Umbonia* (Plates XVI. and XVII.) is well known, but here, too, exact observation of the living insects is much wanted. The manner in which the red stripes are developed on the green or greenish thorn-like pronotum is very realistic and convincing. The fact that the females are far more completely thorn-like than the males (compare Figs. 1, 2, 3 with 4 and 5 on Plate XVI.) may be merely another example of the general principle that the latter sex, when it differs from the former, is more cryptic or more completely mimetic, as the case may be. The greater needs of one sex have been met by increased perfection in those adaptations which are the chief means of defence.

The remaining genera of the *Hoplophorinæ*, figured by Mr. Buckton, viz., *Triquetra*,

Microschema, *Hoplophora*, *Platycotis*, *Potnia*, and *Ochropepla* (Plates XVIII.-XXII.), also suggest cryptic resemblance to various vegetable structures, as a reference to the figures will sufficiently indicate. As in almost all the other cases the bionomics of each of the species requires special study upon the spot. In *Hoplophora sanguinosa* (Plate XIX., Fig. 3) Mr. Buckton suggests the resemblance to a small bee. A probable model may be found by a search among the Neotropical Hymenoptera Aculeata, but observation of the living insects will still be most desirable in order to afford the fullest confirmation of the interpretation.

In the two sub-families, the *Membracinæ* and the *Hoplophorinæ*, cryptic appearances seem to be almost universal, so far as we can judge from the more or less probable interpretations suggested by a study of cabinet specimens and figures. We now reach the *Darninæ*, a sub-family in which mimetic adaptation is the probable explanation of many species. Passing the genus *Aspona* (Plate XXII.), of which the colouring may be cryptic, we reach the contrasted colours and conspicuous patterns of *Darnis* (Plates XXII. and XXIII.). It is highly probable that the appearances which are here figured, indicate aposematic (warning) colours, or else mimicry of the warning colours of other animals. It is probable that one or more of the unpalatable groups of Coleoptera, such as the Phytophaga or the *Coccinellidæ*, afford the models for some of the species, and it has been suggested that others are mimetic of slugs (see page 109). Certainty can only be attained by a study on the spot, but some conclusions with a high degree of probability could, I think, be reached by an examination of a good museum collection of the specially protected Coleoptera from the same part of the world. Some of the species of the genus *Stictopelta* (Plates XXIII. and XXIV.) are also probably mimetic of Coleoptera. The representation of *S. nigrifrons* (Plate XXIII., Fig. 5) especially suggests the appearance of a beetle, such as one of the Phytophaga, with a reddish head, black thorax, and light brown elytra. Other species of this genus possess colours which may be cryptic, and the same is the case with *Hebeticoides*, *Hebetica*, *Tropidarnis*, *Alcmeone*, *Hyphinoë*, *Darnoides*, *Dysyncritus*, *Aconophora*, *Entaphius*, *Hypheus*, *Hemiptycha*, *Nessorrhinus*, and *Cymbomorpha* (Plates XXIII.–XXIX.). The cryptic interpretation is highly probable in some of the species figured, less certain in others. Thus Mr. Buckton's suggestion that *Hebeticoides acutus* (Plate XXIII., Fig. 8) resembles a shining brown seed (page 119), or, at least, some vegetable structure, is in every way probable, as is the bud-, thorn-, or spine-like interpretation of several species of *Aconophora*. A single figured species of this latter genus, *A. W—album* (Plate XXVIII., Fig. 5), appears to possess an aposematic or mimetic colouring. Again, the species of *Alcmeone*, *A. centrotoides*, shown on Plate XXIV., Fig. 6, appears to be cryptic, while *A. godmani*, figured by Canon Fowler on Plate V., Fig. 24, of his monograph in the

Biologia, is justly described by Mr. Buckton as "one of the most conspicuous amongst the *Membracidæ*" (p. 111). The figure strongly suggests warning or mimetic colouration, but a possible cryptic resemblance to a brilliant fungus, fruit, or flower-bud, should not be left out of account in the search for an interpretation.

In *Heteronotus* (Plate XXX.) the resemblance of the pronotal shield to an ant has already been noted. The relation of the ant-like mask to the insect as a whole is well seen in the various figures of Plate XXX. Thus, the dorsal view shows only the mask with wings and legs and part of the head (Figs. 2 and 6a). The lateral view shows no more when the wings and tegmina are somewhat opaque, and are represented in the position which is probably natural during rest (Figs. 1, 3, 4). When they are more transparent, as in Fig. 6, the abdomen may be seen through them, but it is probable that in the natural attitude this part of the body would be raised, and thus, at least, partially hidden by the underside of the mask. When, in a drawing of the side-view, the wings are represented as raised (Figs. 2a and 5), or when the insect is drawn from below (Fig. 4a), the true relationship of mask and insect proper is seen, and the entirely Homopterous character of the insect, as a whole, in spite of its Hymenopteron-like shield, will be at once appreciated. In *Heteronotus trinodosus*, figured in Canon Fowler's monograph in the Biologia Centrali-Americana (Plate VI., Figs. 16, 16a, and 17), a bead-like dilatation is present in the part of the shield which represents the peduncle or stalk connecting the thorax and abdomen of an ant. This structure is evidently in mimetic resemblance of the bead-like enlargement of the peduncle in the *Myrmicidæ*, the family of stinging ants which are specially characteristic of South America. This interesting detail in the likeness between model and mimic was pointed out to me by Mr. W. F. H. Blandford. Mr. Buckton considers that some of the species of this genus mimic striped spiders. If this be the case the resemblance would probably be to spiders which are themselves mimetic of ants, as are many of the *Attidæ*. Observation upon the spot is, above all, necessary in order to settle the question; but should it hereafter be decided in the affirmative, another example would probably be added to the many known instances of that secondary likeness between the mimics of some primary model which appears to be a sure indication of Müllerian (synaposematic) resemblance (*Trans. Ent. Soc. Lond.*, 1902, pp. 511–515). Another interesting subject which must be studied upon the spot is the investigation of the movements and habits of the mimetic *Membracidæ*, and especially these ant-like forms. Mimics of ants are, as a rule, markedly ant-like in their movements, and we should expect this to be the case with the *Membracidæ*, but so far as I am aware no special observations have been made upon them.

The concluding genus *Combophora*, and sub-genus *Anchistrotus*, of the *Darninæ*

seem also to be mimetic, as a glance at Plates XXXI. and XXXII. will suggest. The model of *Combophora beskii* (Plate XXXI., Figs. 1 and 2) appears to be a *Coccinella* or a *Coccinella*-like beetle. But the pattern is so strongly developed and conspicuous as to raise the suspicion of independent unpalatability and Müllerian association. The simple effective Coccinelloid type of pattern and colouring is probably easily reached by variation and selection, and is certainly prone to attract specially protected forms of the most varied affinities into synaposematic groups (see *Trans. Ent. Soc. Lond.*, 1902, p. 520, and P.Z.S. 1902, pp. 268, 270). Another very conspicuous species of the genus *Combophora*, viz., *C. tridensis*, is also represented (Plate XXXI., Figs. 5, 5a). The appearance, together with that of the form of *C. beskii*, shown in Fig. 2, suggests an example of warning colours or mimicry, and the same interpretation probably holds for the other types of colouration represented in Plate XXXI.—the species of *Combophora*, shown in Figures 3, 6, and 7, and *Anchistrotus obesus*, seen in Fig. 4. As regards the latter the white patch on the dark tegmina seems especially suggestive of mimicry or warning colours.

Looking back on the *Darninæ* we are led to believe that at least much of the mimicry in the group is Müllerian rather than Batesian, because of the tendency of the resemblances to appear throughout whole genera, and because the colours and patterns of many species have a marked conspicuousness of their own.

The small fourth sub-family, the *Tragopinæ*, is illustrated on Plates XXXII. and XXXIII. by the genera *Tragopa*, *Chelyoidea*, and *Horiola*. The group is probably mimetic, as Mr. Buckton suggests on p 155 ; but the conspicuous distasteful groups among the Neotropical Rhynchota, as well as Coleoptera, should be investigated for probable models. The shapes shown in Plate XXXII., Figs. 8 and 9, and Plate XXXIII., Figs. 1a and 2, seem especially likely to resemble those of other distasteful Rhynchota. Here too the Müllerian interpretation seems the more probable.

The fifth sub-family, the *Smiliinæ*, is a very large one. The most remarkable of all the species of this remarkable section of the Homoptera are to be found here in *Cyphonia*, and in the genera *Bocydium* and *Œda*, placed by Mr. Buckton between the *Smiliinæ* and the *Centrotidæ*.

The remarkable combination of filaments and dilated spheres developed by the pronotum in certain species of the genus *Cyphonia* (Plate XXXIII., Figs. 4, 5, 6, 7, and 7a), may be compared with the still more extraordinary and complex structures in *Bocydium* (Plate XLV., Figs. 6, 7, and 8 ; Plate XLVI., Figs. 1, 2, and 2a). In the absence of observations on the spot, the most probable interpretation is to suppose a cryptic resemblance to some vegetable structure, such as a spined fruit or seed specially adapted for anchorage in the fur of animals ; or some complex development of thorn or spine. When we consider how far the Neotropical Region surpasses the

rest of the world in the amount and variety of mimetic resemblance in insects we see the outcome of a selective environment which may well have developed cryptic forms more strange and complex than any that are known elsewhere. But the possibility of mimetic likeness in *Cyphonia* and *Bocydium* should not be left out of account in the attempt to solve the problem. The fact that no undoubted explanation is forthcoming is by no means surprising; and even when the living insects are studied under natural conditions it is quite likely that a solution may be long delayed. Every English entomologist has known from boyhood the "Comma" or "C" on the underside of the wings of the butterfly *Grapta C-album;* yet the explanation of a cryptic resemblance to the light seen through a semicircular crack in a weather-beaten fragment of dead leaf, although sufficiently obvious when once stated, was only given a few weeks ago (*Proc. Ent. Soc. Lond.* for May 6, 1903). The writer hopes that Mr. Buckton's figures of species of these two genera may induce naturalists in South America to make a special effort to solve this deeply interesting problem. The observer should keep a very open mind and not neglect effects produced by communities of individuals of the same species, nor the possibility that a single Membracid surmounted by the branching appendages of its pronotum may resemble a combination of two quite different forms, such as an ant or spider attacking or carrying its insect prey. Figs. 4, 5, 6, and 7 on Plate XXXIII., and 1a on Plate XXXIV., should be looked at from this point of view.

Passing to other genera, *Poppea* (Plate XXXIV.) presents structures similar to *Cyphonia*, but on a somewhat smaller scale. In *Ceresa*, *Stictocephala*, *Centrogonia*, *Phacusa*, *Eurytea*, *Acutalis*, *Micrutalis*, *Trachytalis*, and *Polyglypta* (Plates XXXV.–XXXVIII.) we meet with shapes and colours, which generally appear to be explicable without difficulty as examples of protective (cryptic) resemblance to common plant structures. Species of the last-named genus (Plate XXXVIII.) appear to resemble elongated fruits or seeds, although the idea of mimicry of a Brenthid beetle should be tested by observation before being dismissed. *Entylia*, *Publilia*, *Metheisa*, and *Oxygonia* (Plates XXXIX. and XL.) are probably to be explained in the same way, in some cases resembling roughened bark or irregular fruits or seeds, in others perhaps buds.

Parantonaë dipteroides (W. W. Fowler), figured by Canon Fowler on Plate VII., Figs. 10 and 10*a*, of his monograph in the Biologia, is apparently a beautiful mimic, and the aculeate HYMENOPTERA of its sub-region (Central America) should be examined for possible models. Figured with wings outspread the superficial resemblance to a fly is undoubtedly strong, but the effect upon the contour of the dark coloured basal half of the depressed tegmina must be taken into account. Canon Fowler in stating (p. 102) that the species "has the appearance of a *large*

fly" (italics mine), seems to have been influenced by the magnified representation on Plate VII.

In *Adippe*, and perhaps *Argante* (Plates XL. and XLI.), mimetic resemblances or warning colours are again suggested, the most probable models being the conspicuous unpalatable groups of COLEOPTERA. As in so many other cases the extreme conspicuousness suggests the Müllerian rather than Batesian form of mimicry. Protective resemblance to plant structures of various kinds appears to be the interpretation of nearly the whole of the next set of genera, some of which had been also illustrated in earlier plates: *Godingia*, *Antianthe*, *Cyrtolobus*, *Hille*, *Thelia*, *Publilia*, *Atymna*, *Stictocephala*, *Telamona*, and *Heliria* (Plates XLI.–XLIII.). *Gibbomorpha* (Plates XLI. and XLII.) however appears to be more conspicuous and may be aposematic or mimetic. Some of the species of *Telamona*, figured on Plate XLIII., viz., *T. sinuata*, *albidorsata*, and *turritella*, also possess a remarkable colouring which requires investigation in the natural surroundings.

The genera next represented in the plates are those considered as introductory to the *Centrotidæ* proper (p. 205). *Lycoderes* (Plates XLIII.–XLV. and XLVII.) includes species some of which (XLIII. 8; XLIV. 5, 6; XLV. 1, 2) are probably concealed by resemblance to plant structures, while others appear to possess warning or mimetic colours (XLIV. 1, 2, 3; XLVII. 4). *L. burmeisteri* may be mimetic of some other conspicuous distasteful Homopterous insect, such as a Fulgorid. In the remarkable genus *Œda* (Plate XLV.), the pronotum forms a huge inflated sac, the orange-coloured walls of which are transparent and marked with lines due to the existence of a branching network. Mr. Buckton considers this appearance to be leaf-like (p. 205); but it is more probably a case of protective resemblance to the curious cocoons of certain Neotropical moths, which are constructed of an open network of coarse silken strands of an orange colour. The colour of *Œda inflata*, as shown in Plate XLV., Fig. 4, is too dark and opaque to indicate this resemblance. It is, however, sufficiently clear in Erich Haase's, Plate XIII., Figs. 112 and 113 (English translation "Researches on Mimicry," &c., Pt. II., Stuttgart, 1896). Haase himself considered that the insect resembles the empty pupal shell of a butterfly. The entire passage from the original work (Stuttgart, 1893) is as follows: "Ein anderer anscheinender Grenzfall gehört dagegen sicher in die Kategorie der 'Schützenden Aehnlichkeit.' Derselbe betrifft eine merkwürdige neotropische Buckelzirpe *Smilia* (*Oeda*) *inflata*, F., deren Nackenschild von blasigen Hohlräumen durchzogen ist und den winzigen Körper von oben vollkommen verdeckt. So gleicht das auf einem Blatte oder an einem Zweige meist ruhig sitzende Thier durchaus der leeren Puppenhülse eines bereits ausgeschlüpften Tagfalters." The English translation, by M. C. Child, is as follows: "Another apparently transitional case belongs

in reality to the category of 'protective resemblance.' This is the case of a peculiar Membracid, *Smilia* (*Œda*) *inflata*, F., whose pronotum is traversed by sac-like hollow spaces, and completely conceals the tiny body when seen from above. Thus, this insect, which usually sits quietly on a leaf or twig, resembles very closely the empty pupal case of a butterfly."

Passing the astonishing genus *Bocydium*, which has been already discussed on pp. 282, 283, we reach the remarkable genera *Hypsauchenia*, *Micreune*, *Anchon*, *Kleidos*, and *Elaphiceps* (Plates XLVI.–XLIX.). The extraordinary developments of the pronotum in these genera, together with its less specialised form in *Lamproptera* (XLVII., 5), probably serve to conceal the insects by their resemblance to vegetable structures.

The *Centrotidæ* are also abundantly illustrated in this monograph, no less than thirty-four genera being represented by figures, and often many figures, upon the concluding series of plates (XLIX.–LX.). It is not necessary to say much about them, for a glance at the plates will indicate that the forms and colours are in almost all cases such as we should expect to resemble plant structures. There are a few possible exceptions, such as the very dark-coloured species of *Centrotypus*, *Daimon*, and *Ibiceps* (Plates LIV., LV.), in some of which the conspicuousness is further heightened by the contrast with pale markings. But it is impossible to feel confident that some, or even all, of them may not be concealed by resemblance to some special form of environment.

In conclusion, I desire again to call attention to the fact that with few exceptions the foregoing remarks are merely suggestions intended to serve as indications to the naturalist on the spot, and are in no sense dogmatic utterances. I feel that in this most remarkable group of insects the examination of figures, or even of the specimens themselves in a museum, can only occasionally afford us the foundation for a valuable opinion as to the bionomic meaning of the forms, colours, and patterns. But such an examination continually suggests possible interpretations which may lead the observer of the living species to think, and may sometimes even direct him into the right track. It was in the hope that such success might be achieved from time to time that I was glad to accept Mr. Buckton's courteous invitation to contribute this section to his interesting monograph.

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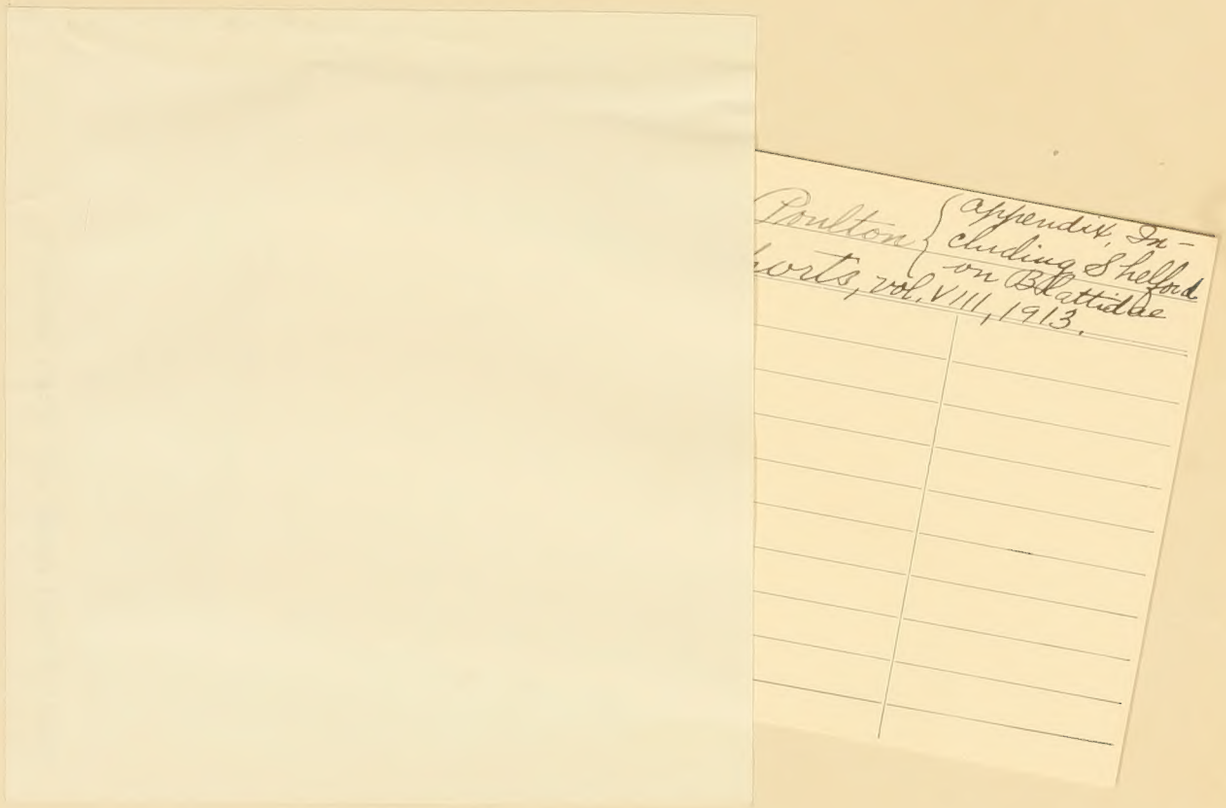
Poulton
Appendix, Including Shelford on Blattidae
orts, vol. VIII, 1913.